

```

1 %_NATH.STY_---_a_LaTeX_document_style_implementing_Natural_maTH_notation
2 %
3 %_Copyright_(c)_1996-2003_by_Michal_Marvan
4 %
5
6 \ifx\nathstyle\undefined
7 \else\typeout{NATH.STY will not be loaded twice.}
8 \expandafter\endinput
9 \fi
10
11 \newlinechar'\^^J
12
13 \typeout{^^JNath as of 21 March 2003
14 \^^JImplementing Natural maTH notation}
15 %
16 %_U_s_a_g_e
17 %
18 %_documentstyle[nath]{article}
19 %
20 %_or
21 %
22 %_documentclass{article}
23 %_usepackage{nath}
24 %
25
26 %
27 %_L_i_c_e_n_s_e
28 %
29
30 %_Nath_is_a_free_software_distributed_under_the_terms_of_the_GNU_General
31 %_Public_License_<http://www.gnu.org/copyleft/gpl.html>_as_published_by
32 %_the_Free_Software_Foundation;_either_version_2_of_the_License,_or
33 %_(at_your_option)_any_later_version.
34 %
35 %_In_particular,_Nath_comes_with_ABSOLUTELY_NO_WARRANTY.
36
37 %
38 %_O_p_t_i_o_n_s
39 %
40
41 %_Options_may_be_also_set_in_the_body_by_\nathstyle.
42
43 \def\nathstyle#1{\@for\@tempa:={#1}\do{\expandafter\nathstyle@\@tempa==\relax}%
44 \ignorespaces}
45
46 \def\on@@@{on}

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47 \def\off@@@{off}
48
49 \def\nathstyle@#1=#2=#3{\def\@tempa{#1}%
50 \expandafter\ifx\csname if#1\endcsname\relax
51 \n@err{Unknown nath style}{I am ignoring the option ‘#1’ in \nathstyle}
52 \else\def\@tempb{#2}%\#3 is ‘relax’ or ‘=’
53 \ifx\@tempb\empty\csname #1true\endcsname\else
54 \ifx\@tempb\on@@@\csname #1true\endcsname\else
55 \ifx\@tempb\off@@@\csname #1false\endcsname\else
56 \n@err{Invalid argument in \string\nathstyle}%
57 {Nath style argument must be either name or name=on or name=off}%
58 \fi\fi\fi
59 \fi}
60
61 \newif\ifgeometry
62 \newif\iftensors
63 \newif\ifleqno
64 \newif\ifdebug
65 \newif\ifsilent
66
67 %
68 %\Error messages and warnings
69 %
70
71 %Nath errors are marked by a black box, sometimes wrongly placed.
72
73 \def\natherrormark{\hbox{\vrule\@height\prorated@em\@width\prorated@ex}}
74
75 \def\n@err#1#2{\errhelp\expandafter{#2}\errmessage{#1}\natherrormark}
76
77 \def\n@warning#1{\ifsilent\else\typeout{Nath Warning: #1\on@line.}\fi}
78
79 \ifx\Nath\undefined\else
80 \n@warning{NATH.STY will not be loaded again}
81 \expandafter\endinput\fi
82
83 %
84 %\Font_s
85 %
86
87 %This style does not introduce any new fonts. It is recommended (but not
88 %required) to have a standard set of AMS fonts introduced independently.
89
90 %
91 %\Dimension_s
92 %

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```

93
94 % A new dimension called \mex (math_ex) is equal to 1ex prorated
95 % according to the level of \mathcount@ (see currstyle)
96
97 \newdimen\mex
98 \mex=1ex
99
100 % Approximately, 1_mex = 8_mu, but can be used where mu cannot, e.g,
101 % with \ifdim, height, depth, width, etc.
102
103 \def\prorated@{\ifcase\mathcount@_1_\or.7_\else.5_\fi}
104
105 %
106 % P_r_o_t_e_c_t_e_d_d_e_f_s
107 %
108
109 % I want that all math commands are robust:
110
111 \newtoks\protect@toks
112
113 \def\pdef#1{\protect@toks=\expandafter{\the\protect@toks
114 _\pdef@#1}%
115 _\def#1}
116
117 \def\pdef@#1{\def#1{\protect#1}}
118
119 % ... even begin and end
120
121 \let\o@begin\begin
122 \pdef\begin{\o@begin}
123
124 \let\o@end\end
125 \pdef\end{\o@end}
126
127 % Macro to make an existing command robust
128
129 \def\makerobust#1{%
130 _\expandafter\let\csname_@@\expandafter@gobble\string_#1\endcsname=#1
131 _\edef#1{\noexpand\protect
132 _\expandafter\noexpand\csname_@@\expandafter@gobble\string_#1\endcsname}}
133
134 % Making composed math symbols robust:
135
136 \makerobust\cong
137 \makerobust\notin
138

```

```

139 %
140 %_ _ _ C _ o _ n _ t _ r _ o _ l _ _ _ m _ a _ c _ r _ o _ s
141 %
142
143 %_Here_is_a_global_version_of_TeX's_loop_macro:
144
145 \def\g@loop#1\repeat{\gdef\g@body{#1}\g@iterate}
146
147 \def\g@iterate{\g@body\global\let\gnext=\g@iterate
148   \else\global\let\gnext=\relax\fi
149   \gnext}
150
151 %_Some_tests_put_their_result_into_ifresult@
152
153 \newif\ifresult@
154
155 \def\old#1{\csname o@#1\endcsname}
156
157 %
158 %_ _ _ S _ t _ a _ c _ k _ s
159 %
160
161 \def\put@#1#2{\edef#2{#1\relax#2}}
162
163 \def\get@#1#2{\expandafter\get@@#2\endget@@#1#2}
164
165 \def\get@@#1\relax#2\endget@@#3#4{\edef#3{#1}\edef#4{#2}}
166
167 %
168 %_ _ _ M _ a _ t _ h _ c _ o _ d _ e _ s
169 %
170
171 %_Many_characters_are_live_(\mathcode_="8000)_in_math_mode.
172
173 %_After_saving_their_original_mathcodes:
174
175 \edef\mc@lparenthesis{\mathchar\the\mathcode'(\relax}
176 \edef\mc@rparenthesis{\mathchar\the\mathcode')\relax}
177 \edef\mc@lbrack{\mathchar\the\mathcode'[\relax}
178 \edef\mc@rbrack{\mathchar\the\mathcode']\relax}
179 \edef\mc@comma{\mathchar\the\mathcode',\relax}
180 \edef\mc@semicolon{\mathchar\the\mathcode';\relax}
181 \edef\lt{\mathchar\the\mathcode'<\relax}
182 \edef\gt{\mathchar\the\mathcode'>\relax}
183 \edef\mc@factorial{\mathchar\the\mathcode'!\relax}
184 \edef\mc@slash{\mathchar\the\mathcode'/\relax}

```

```

185 \edef\vert{\mathchar\the\mathcode'\|\relax}
186
187 %_we_assign_new_ones:
188
189 \mathcode'\(="8000_\mathcode'\[="8000_\mathcode'\<="8000
190 \mathcode'\)="8000_\mathcode'\]="8000_\mathcode'\>="8000
191 \mathcode'\,="8000_\mathcode'\;="8000_\mathcode'\^="8000
192 \mathcode'\!="8000_\mathcode'\'="8000_\mathcode'\_="8000
193
194 %_Before_defining_live_characters,_one_must_call_\livechars@_to
195 %_set_catcodes_to_13_(active).
196
197 \def\livechars@{
198   \catcode'\(=13_\catcode'\[=13_\catcode'\<=13
199   \catcode'\)=13_\catcode'\]=13_\catcode'\>=13
200   \catcode'\,=13_\catcode'\;=13
201   \catcode'\!=13_\catcode'\'=13}
202
203 \def\killchars@{
204   \catcode'\(=12_\catcode'\[=12_\catcode'\<=12
205   \catcode'\)=12_\catcode'\]=12_\catcode'\>=12
206   \catcode'\,=12_\catcode'\;=12
207   \catcode'\!=12_\catcode'\'=12}
208
209 %_Here_are_the_definitions:
210
211 \livechars@
212
213 \def{\delim@l_1\ch@lparenthesis}
214 \def{\delim@r_1\ch@rparenthesis}
215 \def[\delim@l_1\o@lbrack}
216 \def[\delim@r_1\o@rbrack}
217 \def!\factorial}
218 \def,{\@comma}
219 \def;\@semicolon}
220 \def'\@abbreviation}
221
222 %_Every_math_calls_\mathoptions@_to_set_live_definition_of_<,>
223 %_depending_on_the_current_value_of_ifgeometry;_and_to_set
224 %_fontdimens_according_to_the_current_value_of_iftensors
225
226 %_The_following_control_sequences_contain
227
228 \def\mathoptions@on{%
229   \ifgeometry%_if_geometry=on
230   \def<{\delim@l_1\o@langle}%

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231 \def>{\delim@r_1\o@rangle}%
232 \else%_if_geometry=off
233 \def<{\lt}%
234 \def>{\gt}%
235 \fi
236 \iftensors%_if_tensors=on
237 \edef\fdviii@textfontiii{\the\fontdimen8\textfont3}%
238 \edef\fdxiii@textfontii{\the\fontdimen13\textfont2}%
239 \edef\fdxiv@textfontii{\the\fontdimen14\textfont2}%
240 \edef\fdxv@textfontii{\the\fontdimen15\textfont2}%
241 \edef\fdxvi@textfontii{\the\fontdimen16\textfont2}%
242 \fontdimen 8\textfont3=.075ex%_1/4_of_min_superscript/subscript_clearance
243 \fontdimen13\textfont2=1.3ex%_min_superscript_shift_in_displaystyle
244 \fontdimen14\textfont2=1.3ex%_min_superscript_shift_otherwise
245 \fontdimen15\textfont2=1.3ex%_min_superscript_shift_in_restricted_style
246 \fontdimen16\textfont2=.65ex%_min_subscript_shift_if_no_superscript
247 \fontdimen17\textfont2=0ex%_min_subscript_shift_if_no_superscript
248 \relax
249 \fi
250 }
251
252 \def\mathoptions@off{%
253 \iftensors
254 \fontdimen 8\textfont3=\fdviii@textfontiii
255 \fontdimen13\textfont2=\fdxiii@textfontii
256 \fontdimen14\textfont2=\fdxiv@textfontii
257 \fontdimen15\textfont2=\fdxv@textfontii
258 \fontdimen16\textfont2=\fdxvi@textfontii
259 \relax
260 \fi}
261
262
263 \killchars@
264
265 %
266 %_D_o_l_l_a_r_s
267 %
268
269 %_Math_mode_is_inline_or_displayed.
270 %_Top_level_macros_to_start_either_mode_are:
271
272 %_To_start_use
273 %_-----
274 %_inline_math_...$
275 %_displayed_math_$$$...$$_or_[...]
276 %_or_math_environments_such

```

```

277 %%%%%%%%%as equation, eqns, eqns*
278
279 % The $ is active (catcode = 13).
280 %
281 % The original $ (catcode = 3) is stored in \o@dollar.
282 % \o@math is the original $ followed by \relax.
283 % \o@display is the original double $$ .
284
285 \let\o@dollar=$
286 \def\o@math{\o@dollar\relax} % calls \everymath
287 \def\o@display{\o@dollar\o@dollar} % calls \everydisplay
288
289 % \everymath and \everydisplay
290
291 \everymath{} % keep empty
292 \everydisplay{} % keep empty
293
294
295 \catcode'\$=13
296
297 \def$#1${\@@dollar{#1}}
298
299 \pdef\@@dollar#1{%
300   \ifmmode\else\begingroup\fi % no begingroup if closing $
301   \def\next{#1}%
302   \ifx\next\empty % if $$
303     \ifmmode % if closing $$
304       \] \def\next{\endgroup\ignorespaces}%
305     \else \[ \def\next{\relax}%
306     \fi
307     \else % if $; #1 = the whole content between $'s
308       \imath@{#1}%
309       \let\next\endgroup
310     \fi
311     \next}
312
313 \catcode'\$=3
314
315
316 % $'s eventually call internal commands to start math mode, which are
317 % \imath@{...}
318 % ... \dmathoff@
319
320 \def\dmathon@{\o@math
321   \setbox\sizebox\delimstrut@ % initialize sizebox
322   \begingroup

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```

323 \mathoptions@on
324 \displayon@%start_displayed
325 }
326
327 %\dmathoff@==end_displayed_style
328 %end_group
329
330 \def\dmathoff@{\enddisplaydelims@
331 \mathoptions@off
332 \endgroup
333 \o@math}
334
335 \def\imath@#1{\mathoptions@on\o@math\inline{#1}\o@math\mathoptions@off}
336
337 \def\(#1\){\imath@{#1}}
338
339 %The_math_environment_is_disabled
340
341 \def\math{\n@err{Disabled environment. Use $ to begin math}
342 {I am inserting $ to start inline math mode.}\o@math}
343 \def\endmath{\n@err{Obsolete command. Use $ to end math.}
344 {I am inserting $ to end inline math mode.}\o@math}
345
346 %
347 %G_e_n_e_r_i_c_d_i_s_p_l_a_y_m_a_t_h_m_a_c_r_o
348 %
349
350 %$$, \[, \], and all displayed math environments use low-level macros
351 %make@eq/endmake@eq to format a displayed formula.
352 %Usage:
353 %
354 %\o@display\make@eq
355 %...
356 %\endmake@eq\o@display
357
358 %There is a dimension register called \mathindent to control the
359 %positioning. If \mathindent > 0, formulas are left-indented that
360 %amount, otherwise they are centered.
361
362 \newdimen\mathindent
363 \mathindent=4pc
364
365 \newdimen\disp@box@width
366 \newdimen\disp@width
367
368 \let\o@label=\label%store the original \label

```



```

369
370 \newif\ifmultiline@
371
372 \let\o@eqno=\eqno\%_store_the_TeX's_\eqno
373 \let\o@leqno=\leqno\%_store_the_TeX's_\leqno
374
375 \def\make@eq{%
376   \global\let\do@eqno=\curr@eqno
377   \def\the@eqlabel{%
378     \def\label##1{\gdef\the@eqlabel{##1}}%
379     \display@true
380     \nodisplay@false
381     \protectinline@false
382     \ifdim\mathindent<0pc\%_if_centered_then_nothing
383     \else\%_if_flushleft
384     \disp@box@width=\linewidth\advance\disp@box@width-\mathindent
385     \disp@width=\disp@box@width\advance\disp@width-\mathindent
386     \hbox to \disp@width\bgroup
387     \vbox\bgroup\%_ifdebug\hrule\fi
388     \hsize\disp@box@width
389     \parindent=0pt
390     \parfillskip=0pt
391     \leavevmode\o@math
392     \fi
393   \global\multiline@false
394   \setbox0\vbox\bgroup\%_starting_(multiline)_vbox
395
396   \def\endmake@eq{\egroup\%_ending_(multiline)_vbox
397   \ifeqnumbering@
398   \ifmultiline@
399     \vcenter{\box0}\%_make_the_equation_number_vertically_centered
400   \else\box0
401   \fi
402   \ifdim\mathindent<0pc\%_if_centered
403     \ifleqno\else\o@eqno{\do@eqno}\fi
404   \else\%_if_flushleft
405     \o@math
406     \hfil\null
407     \ifleqno\else\hfil\null\hfil\hbox{\do@eqno}\fi
408   \egroup
409   \hss\egroup
410   \fi
411   \ifleqno\o@leqno{\do@eqno}\fi
412   \else\%_if_no_numbering
413   \ifdim\mathindent<0pc\%_if_centered
414     \box0

```

```

415 \else\box0\o@math\hfil\null\egroup\hss\egroup
416 \fi
417 \fi
418 }
419
420 %The purpose of the vbox with parfillskip=0 and triple filling
421 %is that the equation number will go on the line following the
422 %formula if the formula is too long.
423
424 %Catch the global option 'leqno':
425
426 \def\ds@leqno{\leqnottrue}
427
428 %
429 %Display lines and blocks
430 %
431
432 %A single natural-width hbox with displayed material inside
433 %is produced by \displayline@.
434
435 %Here is the skip between adjacent displaylines
436
437 \newskip\interdisplayskip
438 \interdisplayskip=1.67ex
439
440 %An empty displayline must not produce any vertical space.
441 %Empty is if of length < or = to zero
442
443 \def\displayline@{\setbox0\hbox\bgroup
444 \o@math\dcrrstyle@}
445
446 \def\enddisplayline{\o@math\egroup
447 \ifdim\wd0>0pt\box0
448 \else\box0
449 \vskip-\interdisplayskip
450 \fi}
451
452 %The formula inside may actually be a wall-return block, i.e.,
453 %may be multiline.
454
455 %A multiline block is a top-aligned vbox, followed by new line.
456 %The command to start a block is \wall, the command to end it
457 %is \return. Adjacent returns must not generate an empty line.
458 %
459 %\wall
460 %formula; lines separated with \\

```

```

461 %\return
462 %
463
464 \newif\ifinnerwall@%_if_inside_another_wall-return_block
465 \innerwall@false
466
467 %We define generic \d@wall and \d@return here. Actual wall and return
468 %are defined in displaydelims, after some escape machinery.
469
470 \def\d@wall#1{\hbox\bgroup
471 %\ifdebug\vrule\@width_1pt\fi
472 \vtop\bgroup\offinterlineskip
473 \if0#1%_if_wall
474 \edef\pad@{\relax}
475 \else%_if_shifted
476 \edef\pad@{\pad@\@cdr#1\@nil}
477 \fi
478 \innerwall@true
479 \displayline@
480 }
481
482 \def\d@return{\enddisplayline
483 \egroup%_end_vtop
484 %\ifdebug\vrule\@width_1pt\fi
485 \egroup%_end_hbox
486 \ifinnerwall@\curr@cr\fi
487 }
488
489 %Inside any wall-return_block, \_should_be\d@cr:
490
491 \def\d@cr#1{\enddisplayline\vskip\interdisplayskip
492 \global\multiline@true
493 \displayline@
494 #1%_may_be\pad@_or\relax
495 }
496
497 %If \wall_is_misplaced
498
499 \newif\ifwallallowed@
500 \wallallowed@true
501
502 %
503 %\Display_maths_environment
504 %
505
506 %A_single_equation;_unnumbered:

```

```

507 %
508 %\complete_formula_$
509 %_or
510 %\complete_formula_
511
512 %_numbered:
513 %
514 %\begin{equation}_complete_formula_\end{equation}
515
516 %_A_pile_of_equations;_unnumbered:
517 %
518 %\begin{eqns*}
519 %\complete_formulas_separated_with_\\
520 %\end{eqns*}
521
522 %_numbered:
523 %
524 %\begin{eqns}
525 %\complete_formulas_separated_with_\\
526 %\end{eqns}
527
528 %_holding_the_same_number;_followed_by_a_letter:
529 %
530 %\begin{eqnabc}
531 %\complete_formulas_separated_with_\\
532 %\end{eqnabc}
533
534 %_The_environments_set_ifeqnumbering@
535 %_and_call_make@eq.
536 %_$$,_\[_and_\begin{equation}_start_a_wall-return_block.
537 %_This_means_that
538
539 \def\[\begin{group
540 \global\eqnumbering@false
541 \curr@cr@is@wall@cr
542 \o@display\make@eq\hbox\bgroup\dmathon@\wall\mathopen{}}
543
544 \def\]\return\dmathoff@\egroup\endmake@eq\o@display
545 \endgroup\ignorespaces}
546
547 \newif\ifeqnumbering@_global
548
549 \def\equation{\begin{group
550 \global\eqnumbering@true
551 \curr@cr@is@wall@cr
552 \o@display\make@eq\hbox\bgroup\dmathon@\wall\mathopen{}}

```

```

553
554 \def\endequation{\return\dmathoff@\egroup\endmake@eq\o@display
555 \endgroup\global\@ignoretrue}
556
557 %Unnumbered equation for backward compatibility
558
559 \expandafter\def\csname equation*\endcsname{\[]
560 \expandafter\def\csname endequation*\endcsname{\}\global\@ignoretrue}
561
562 %Important! The \mathopen{ } after \wall protects active characters from
563 %being scanned prematurely.
564
565 \def\eqns{\begingroup
566 \belowdisplayskip@=\belowdisplayskip
567 \belowdisplayskip=0pt
568 \belowdisplayshortskip=0pt
569 \global\eqnumbering@true
570 \def\curr@cr{\eqns@cr\global\eqnumbering@true}
571 \let\\curr@cr
572 \postdisplaypenalty=9999
573 \belowdisplayshortskip=\belowdisplayskip
574 \o@display\make@eq\hbox\bgroup\dmathon@}
575
576 \def\endeqns{\dmathoff@\egroup
577 \endmake@eq\o@display
578 \vskip\belowdisplayskip@
579 \endgroup
580 \global\@ignoretrue
581 \noindent}
582
583 \expandafter
584 \def\csname eqns*\endcsname{\begingroup
585 \belowdisplayskip@=\belowdisplayskip
586 \belowdisplayskip=0pt
587 \belowdisplayshortskip=0pt
588 \global\eqnumbering@false
589 \def\curr@cr{\eqns@cr\global\eqnumbering@false}
590 \let\\curr@cr
591 \postdisplaypenalty=10000
592 \belowdisplayshortskip=\belowdisplayskip
593 \o@display\make@eq\hbox\bgroup\dmathon@}
594
595 \expandafter
596 \def\csname endeqns*\endcsname{\endeqns}
597
598 \def\eqns@cr{\dmathoff@\egroup\endmake@eq\o@display

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```

599 \hrule\@height 0pt
600 \abovedisplayskip=0pt plus 0pt minus 0pt
601 \vglue\intereqnsskip
602 \hrule\@height 0pt
603 \o@display \make@eq\hbox\bgroup\dmathon@}
604
605 \def\nonumber{\global\eqnumbering@false}
606
607 \def\numbered{\global\eqnumbering@true}
608
609 \newskip\intereqnsskip
610 \intereqnsskip=1ex
611
612 \newskip\belowdisplayskip@
613
614 %
615 % E q u a t i o n n u m b e r i n g
616 %
617
618 % Displaymath (namely \endmake@eq) calls \do@eqno to create the
619 % equation number. At the beginning of each display, \do@eqno is
620 % set to \curr@eqno. Numbering macros should define \curr@eqno,
621 % while \eqno changes \do@eqno directly.
622
623 % \do@eqno calls \make@eqno, a generic command to make its
624 % argument into both the equation number and the currentlabel.
625
626 \def\make@eqno#1{\def\make@eqno@{#1}%\rm removed thanks to E.H. Lohse
627 \def\@currentlabel{\make@eqno@}
628 \ifx\the@eqlabel\empty\n@warning{No label in equation (#1)}
629 \else
630 \ifeqnumbering@\o@label{\the@eqlabel}
631 \else\n@warning{Label occurs in an unnumbered formula}
632 \fi
633 \fi
634 \hbox{\rm(\make@eqno@)%
635 \ifnum\overfullrule>0%\if draft
636 \hbox to 0pt{\hglue 1pc‘‘{\tt\the@eqlabel}’’\hss}%
637 \fi}%
638 }
639
640 % The command \eqno defines \do@eqno to call \make@eqno on the
641 % \eqno's argument.
642
643 \def\eqno#1{\global\eqnumbering@true\gdef\do@eqno{\make@eqno{#1}}}
644

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```

645 %_Default_\curr@eqno_creates_the_default_numbering_(N),_where
646 %_N_is_the_current_value_of_\theequation,_stepped_each_time
647 %_\curr@eqno_is_called.
648
649 \def\curr@eqno{\refstepcounter{equation}
650 \_make@eqno{\theequation}}
651
652 %_subabc_is_an_environment_to_change_numbering_from_(1),_(2),_(3)
653 %_to_(1a),_(1b),_(1c),_i.e.,_to_(NL)_where_N_is_the_value_of
654 %_\theequation_(stepped_only_when_the_environment_starts)_and_L_is
655 %_the_letter_corresponding_to_the_current_value_of_the_counter
656 %_eqnabc_(stepped_each_time_\curr@eqno_is_called,_starting
657 %_from_0_in_the_beginning_of_subabc).
658
659 \newcount\c@eqnabc
660
661 \def\subabc{\refstepcounter{equation}
662 \_c@eqnabc=0
663 \_def\curr@eqno{\refstepcounter{eqnabc}
664 \_make@eqno{\theequation\alph{eqnabc}}}}
665 }
666
667 \def\endsubabc{\global\@ignoretrue}
668
669 %
670 %_A_l_l_i_g_n_m_e_n_t_e_n_v_i_r_o_n_m_e_n_t_s
671 %
672
673 \newskip\displaylineskip
674 \newskip\displaybaselineskip
675 \newdimen\displaylineskiplimit
676
677 \displaylineskip=1.2ex_plus_0.2ex
678 \displaybaselineskip=3.8ex_plus_0.2ex
679 \displaylineskiplimit=.01ex
680
681 \def\dmstrut@{\hbox{\vrule\@height_1.7ex\@depth_.7ex\@width_0ex}}
682
683 \newdimen\eqnumlowering@
684
685 \def\eqnarray{%
686 \_global\let\do@eqno=\curr@eqno
687 \_def\the@eqlabel{}%
688 \_def\label##1{\gdef\the@eqlabel{##1}}%
689 \_x@eqnarray}
690

```

```

691 \expandafter\def\csname eqnarray*\endcsname{\def\@eqnarray@cr{\cr}
692 \x@eqnarray}
693
694 \def\x@eqnarray{%
695 \ifdim\mathindent<\z@\mathindent=-\mathindent
696 \n@warning{Negative\mathindent in eqnarray}
697 \fi
698 \o@display\make@eq
699 \def\curr@cr{\@eqnarray@cr
700 \global\multiline@false
701 \global\eqnumbering@true
702 \global\let\do@eqno=\curr@eqno}
703 \let\\\curr@cr
704 \global\eqnumbering@true
705 \vbox\bgroup%%}%
706 \ddelimalign@errhelp
707 \displaydefs@
708 \lineskip\displaylineskip\baselineskip\displaybaselineskip
709 \lineskiplimit\displaylineskiplimit
710 \ialign\to\disp@box@width
711 \bgroup
712 \gdef\missing@tabs{&&&}%
713 \hfil\hbox{\wallallowed@false\dmathon@\dmstrut@##\dmathoff@}%
714 \tabskip_Opt
715 \gdef\missing@tabs{&&}%
716 &\hfil\hbox{\wallallowed@false\o@dollar\null##\null\o@dollar}\hfil
717 \tabskip_Opt
718 \gdef\missing@tabs{&}%
719 &\setbox0\vbox{\hbox{\o@dollar\dmathon@\dmstrut@\mathopen{}}##\dmathoff@
720 \o@dollar}}%
721 \global\eqnumlowering@=0pt
722 \global\advance\eqnumlowering@\dp0
723 \box0\hfil
724 \tabskip_Opt_plus_1000pt
725 \gdef\missing@tabs{}%
726 &\setbox0\llap{##}%
727 \ifmultiline@\lower.5\eqnumlowering@\box0
728 \else\box0
729 \fi\tabskip_Opt\crr}
730
731 \def\endeqnarray{
732 \@eqnarray@cr
733 \egroup\egroup
734 \global\eqnumbering@false
735 \endmake@eq\o@display
736 \global\@ignoretrue}

```



```

783 %
784
785 \expandafter\ifx\csname\paritemwd\endcsname\relax
786 \newdimen\paritemwd\paritemwd=2pc
787 \fi
788
789 \def\paritem#1{%
790 \ifmmode
791 \ifdisplay@
792 \ifdim\mathindent<0pt\%_if_centered_formula
793 \ifleqno\%_equation_numbers_on_the_left
794 \paritem@leqno{#1}
795 \else
796 \n@err{Disallowed \string\paritem}
797 {Sorry, I am not programmed to handle this case.
798 ^^JSet \mathindent to a positive length to
799 circumvent the problem.}
800 \fi
801 \else\%_if_left-aligned_formula
802 \ifleqno\%_equation_numbers_on_the_left
803 \paritem@leqno{#1}
804 \else
805 \llap{\hbox to \mathindent{\paritem@{#1}\hfil}}
806 \fi
807 \fi
808 \else\n@err{Misplaced \string\paritem}
809 {It is disallowed to start \paritem in inline math mode}
810 \fi
811 \else
812 \par\noindent\paritem@{#1}\kern 1ex
813 \fi
814 \ignorespaces}
815
816 \def\paritem@#1{\hbox to\paritemwd{\hss\rm#1}\ignorespaces}
817
818 \def\paritem@leqno#1{
819 \ifeqnumbering@
820 \n@warning{Left numbering superseded by \string\paritem}
821 \else\global\eqnumbering@true
822 \fi
823 \global\def\do@eqno{\paritem@{#1}}
824 }
825
826 %
827 %_M_a_t_h_m_o_d_e_s
828 %

```

```

829
830 % The four math styles of plain TeX (displaystyle, textstyle, scriptstyle,
831 % scriptscriptstyle) are abandoned.
832 % We distinguish two math mode: inline and displayed.
833 % They must always apply to a whole subformula and it is not possible to
834 % switch between them arbitrarily.
835
836 % While in math mode,
837
838 % to start use
839 % -----
840 % inline style \inline{...}
841 % displayed style \displayed{...}
842
843 % displayed
844
845 \newif\ifnodisplay@
846
847 \def\displayon@{%
848   \ifnodisplay@ \n@err{Misplaced displayed}%
849   {Do not start display mode between inline delimiters.}%
850   \else \mspaces@
851   \displaydelims@ \dcurrstyle@
852   \fi}
853
854 \def\displayoff@{\enddisplaydelims@}
855
856 \pdef\displayed#1{\displayon@#1\displayoff@}
857
858 \def\mspaces@{\relax}
859
860 % Inline -- I want that user macros expand to reveal Nath behind them
861
862 \newif\ifprotectinline@
863 \protectinline@true
864
865 \pdef\inline#1{%
866   \begingroup
867   \ifprotectinline@
868     \begingroup
869     \the\protect@toks
870     \def\protect{\noexpand}
871     \xdef\inline@{\noexpand\wrapfrac@{ #1}}
872     \endgroup
873     \protectinline@false
874   \else

```

```

875 \def\inline@{\wrapfrac@{#1}}%
876 \fi
877 \display@false
878 \inlinedelims@\icurrstyle@
879 \inline@
880 \ldelim@warningcheck{\idelimlevel@}%
881 \endgroup}
882
883 % We need a script level count
884
885 \newcount\mathcount@ %% means the level of sub- and super-script (0,1,2,...)
886
887 % and an \ifdisplay
888
889 \newif\ifdisplay@ %% if a displayed formula
890
891 % We store the four math style switches for future use.
892
893 \let\o@displaystyle=\displaystyle
894 \let\o@textstyle=\textstyle
895 \let\o@scriptstyle=\scriptstyle
896 \let\o@scriptscriptstyle=\scriptscriptstyle
897
898 % We redefine \displaystyle and \textstyle; their original effect is disabled.
899 % \displaystyle is useful in the context of the principle of smallest fences.
900 %
901 % We also redefine \scriptstyle and \scriptscriptstyle to advance \mathcount@
902 % by 1 and 2, respectively.
903 % Observe that \scriptstyle\scriptstyle now has the same effect as
904 % \scriptscriptstyle
905
906 \def\displaystyle{\setbox0
907 \hbox{\vrule\@height 3.2\mex \@depth 2\mex \@width 1pt}}%
908 \resizebox{0}{
909
910 \let\textstyle\relax
911
912 \def\scriptstyle{\advance\mathcount@1 \icurrstyle@}
913
914 \def\scriptscriptstyle{\advance\mathcount@2 \icurrstyle@}
915
916 %
917 % M a t h s i z e s
918 %
919
920 \newdimen\delimaxis@

```

```

921 \newdimen\strutsizes@
922
923 \delimaxis@=.3ex
924 \strutsizes@=2.1ex
925
926 \def\delimstrut@{\hbox{\@tempdima=\delimaxis@ \@tempdimb=\delimaxis@
927 \advance\@tempdima .5\strutsizes@ \advance\@tempdimb -.5\strutsizes@
928 \vrule height\prorated@ \@tempdima depth\prorated@ \@tempdimb width Opt}}
929
930 \def\dcrrstyle@{\display@true
931 \ifcase\mathcount@ \o@displaystyle \mex=1ex
932 \or\o@scriptstyle \mex=.7ex
933 \else\o@scriptscriptstyle \mex=.5ex
934 \fi}
935
936 \def\icrrstyle@{\display@false
937 \ifcase\mathcount@ \o@textstyle \mex=1ex
938 \or\o@scriptstyle \mex=.7ex
939 \else\o@scriptscriptstyle \mex=.5ex
940 \fi}
941
942 \def\currstyle@{%
943 \ifcase\mathcount@ \mex=1ex
944 \ifdisplay@\o@displaystyle
945 \else\o@textstyle
946 \fi
947 \or\o@scriptstyle \mex=.7ex
948 \else\o@scriptscriptstyle \mex=.5ex
949 \fi}
950
951 % One step smaller than currstyle is \iscriptstyle@:
952
953 \def\iscriptstyle@{\display@false\scriptstyle}
954
955 \def\currstyle@hbox#1{%
956 \ifdisplay@
957 \hbox{\dmathon@\dcrrstyle@ #1%
958 \global\setbox\sizebox@\box\sizebox
959 \dmathoff@}%
960 \resizebox@{\sizebox@}%
961 \else
962 \hbox{\imath@\icrrstyle@ #1}}%
963 \fi}
964
965 \def\scriptstylehbox@#1{\hbox{\imath@\iscriptstyle@ #1}}
966

```

```

967 %_Frame_around_a_subformula
968
969 \let\o@fbox\fbox
970
971 \pdef\framed#1{\o@fbox{\o@math\currstyle@hbox{#1}\o@math}}
972
973 %_A_repeated_sizebox:
974
975 \def\samesize@{\mathopen{}\copy\sizebox}
976
977 %_We_redefine_\mathpalette_and_\mathchoice,_although_they_are_no
978 %_more_needed
979
980 \def\mathpalette#1#2{{#1\currstyle@{#2}}}
981
982 \def\mathchoice#1#2#3#4{%
983   \ifcase\mathcount@
984     \ifdisplay@_#1\else_#2\fi
985     \or_#3
986     \else_#4
987   \fi_}
988
989 %
990 %_R_e_s_t_r_i_c_t_e_d_m_o_d_e
991 %
992
993 \newif\iftoprestricted@
994 \toprestricted@true
995
996 \newif\ifbotrestricted@
997 \botrestricted@true
998
999 %
1000 %_T_e_x_t
1001 %
1002
1003 \newtoks\curr@rm_%_global_needed?
1004
1005 \pdef\text#1{\mathclose{}\text@
1006   \hbox\expandafter{\protect\the\curr@rm_#1}\mathopen{}
1007   \penalty\punctpenalty\relax}%_Fixed_5.9.2002_thanks_to_Hedevang_Lohse
1008
1009 \def\text@{%
1010   \ifcase\mathcount@_ \global\curr@rm\expandafter{\the\textfont0_}%
1011   \or_ \global\curr@rm\expandafter{\the\scriptfont0_}%
1012   \else_ \global\curr@rm\expandafter{\the\scriptscriptfont0_}%

```

```

1013 \fi}
1014
1015 %
1016 % Sizing commands
1017 %
1018
1019 % The size of delimiters is determined by the ‘heavy’ part of the
1020 % subformula enclosed. ‘Ignorable’ elements (sub- and superscripts,
1021 % diacritics) do not contribute.
1022
1023 % We use a local box register called \sizebox. Although empty,
1024 % it has its height and depth, equal to the height and depth of the
1025 % ‘main part’ of the current subformula in displayed style.
1026
1027 \newbox\sizebox% local
1028 \newbox\sizebox@% global
1029
1030 \def\setsize@#1{%
1031 \ifdisplay@
1032 \setbox0\hbox{\o@math\dcrrstyle@#1\o@math}%
1033 \resizebox@{0}%
1034 \fi}
1035
1036 % Called by \setsize@ and \currstyle@hbox, the command \resizebox@ compares
1037 % vertical dimensions of \sizebox to those of box#1 and sets them to
1038 % whichever is bigger.
1039
1040 \def\resizebox@#1{%
1041 \ifdim\ht\sizebox<\ht#1\ht\sizebox=\ht#1\fi
1042 \ifdim\dp\sizebox<\dp#1\dp\sizebox=\dp#1\fi}
1043
1044 % A debugging tool - visualize vertical dimensions of certain boxes
1045
1046 \def\showverticaldimensionsofthebox#1{%
1047 \hbox{\vrule \@height \ht#1 \@depth \dp#1 \@width .667pt}}
1048
1049 % Sizing commands for every large operator from TeXbook p. 435
1050
1051 \let\o@sum=\sum
1052 \let\o@prod=\prod
1053 \let\o@coprod=\coprod
1054 \let\o@int=\int
1055 \let\o@oint=\oint
1056 \let\o@bigcap=\bigcap
1057 \let\o@bigcup=\bigcup
1058 \let\o@bigsqcup=\bigsqcup

```

```

1059 \let\o@bigvee=\bigvee
1060 \let\o@bigwedge=\bigwedge
1061 \let\o@bigodot=\bigodot
1062 \let\o@bigotimes=\bigotimes
1063 \let\o@bigoplus=\bigoplus
1064 \let\o@biguplus=\biguplus
1065
1066 \pdef\big@op#1{\setsize@{#1}\mathop{#1}}
1067
1068 \def\sum{\big@op\o@sum}
1069 \def\prod{\big@op\o@prod}
1070 \def\coprod{\big@op\o@coprod}
1071 \def\oint{\big@op\o@oint\nolimits}
1072 \def\bigcap{\big@op\o@bigcap}
1073 \def\bigcup{\big@op\o@bigcup}
1074 \def\bigsqcup{\big@op\o@bigsqcup}
1075 \def\bigvee{\big@op\o@bigvee}
1076 \def\bigwedge{\big@op\o@bigwedge}
1077 \def\bigodot{\big@op\o@bigodot}
1078 \def\bigotimes{\big@op\o@bigotimes}
1079 \def\bigoplus{\big@op\o@bigoplus}
1080 \def\biguplus{\big@op\o@biguplus}
1081
1082 % \int sticks to any following \int.
1083
1084 \pdef\int{\setsize@o@int\int@stick}
1085
1086 \def\int@stick{\afterassignment\int@stick@let\next=}
1087
1088 \def\int@stick@{
1089   \ifx\next\int
1090     \def\next@comm{\intop\int@kern\int}
1091   \else
1092     \def\next@comm{\intop\nolimits\next}
1093   \fi
1094   \next@comm}
1095
1096 \def\int@kern{\ifdisplay@ \kern-1.4\mex \else \kern -.9\mex \fi}
1097
1098 %
1099 % L_i v_e d e l i m i t e r s
1100 %
1101
1102 % Every delimiter stands for itself. No additional presentation markup
1103 % (such as \biggl, \biggr or \left, \right) is needed.
1104 % Warning: In math mode [, ] no more denote optional arguments.

```



```

1105
1106 \newcount\idelimlevel@
1107
1108 %_Store_\TeX's_delimiters_for_character_tests
1109
1110 \let\ch@lparenthesis=(
1111 \let\ch@rparenthesis=)
1112
1113 \let\ch@lbrack=[
1114 \let\ch@rbrack=]
1115
1116 \let\ch@langle=<
1117 \let\ch@rangle=>
1118
1119 \let\o@lbrack=\lbrack
1120 \let\o@rbrack=\rbrack
1121
1122 \let\o@lfloor=\lfloor\let\o@lceil=\lceil
1123 \let\o@rfloor=\rfloor\let\o@rceil=\rceil
1124
1125 \def\o@lbrace{\delimiter"4266308}\let\{=\o@lbrace
1126 \def\o@rbrace{\delimiter"5267309}\let\}=\o@rbrace
1127
1128 \let\o@langle=\langle
1129 \let\o@rangle=\rangle
1130
1131 \let\o@uparrow=\uparrow
1132 \let\o@downarrow=\downarrow
1133 \let\o@updownarrow=\updownarrow
1134 \let\o@Uparrow=\Uparrow
1135 \let\o@Downarrow=\Downarrow
1136 \let\o@Updownarrow=\Updownarrow
1137
1138 \let\o@backslash=\backslash
1139 \let\o@vert=|
1140 \let\o@Vert=\Vert
1141
1142 \pdef\{\delim@l_1\o@lbrace}
1143 \pdef\}\delim@r_1\o@rbrace}
1144
1145 \pdef\lvert{\delim@l_1|}
1146 \pdef\rvert{\delim@r_1|}
1147 \pdef\lVert{\delim@l_1\Vert}
1148 \pdef\rVert{\delim@r_1\Vert}
1149 \pdef\lbrack{\delim@l_1\o@lbrack}
1150 \pdef\rbrack{\delim@r_1\o@rbrack}

```

```

1151 \pdef\langle{\delim@l_1\o@langle}
1152 \pdef\rangle{\delim@r_1\o@rangle}
1153 \pdef\lbrace{\delim@l_1\o@lbrace}
1154 \pdef\rbrace{\delim@r_1\o@rbrace}
1155 \pdef\lfloor{\delim@l_1\o@lfloor}
1156 \pdef\rfloor{\delim@r_1\o@rfloor}
1157 \pdef\lceil{\delim@l_1\o@lceil}
1158 \pdef\rceil{\delim@r_1\o@rceil}
1159
1160 \pdef\lBrack{\delim@l_2\o@lbrack}
1161 \pdef\rBrack{\delim@r_2\o@rbrack}
1162 \pdef\lAngle{\delim@l_2\o@langle}
1163 \pdef\rAngle{\delim@r_2\o@rangle}
1164 \pdef\lFloor{\delim@l_2\o@lfloor}
1165 \pdef\rFloor{\delim@r_2\o@rfloor}
1166 \pdef\lCeil{\delim@l_2\o@lceil}
1167 \pdef\rCeil{\delim@r_2\o@rceil}
1168
1169 %_Null_delimiters
1170
1171 \pdef\lnull{\delim@l_0.}
1172 \pdef\rnull{\delim@r_0.}
1173
1174 %_Obsolete_commands:
1175
1176 \let\Big\relax\let\Bigg\relax
1177 \let\Bigl\left\let\Biggl\left
1178 \let\Bigr\right\let\Biggr\right
1179 \let\Bigm\middle\let\Biggm\middle
1180
1181 %
1182 %_L_e_f_t, _r_i_g_h_t _a_n_d _m_i_d_d_l_e
1183 %
1184
1185 %_Store_\TeX's_definitions
1186
1187 \let\o@left=\left
1188 \let\o@right=\right
1189 \let\@stop=.
1190
1191 %_Here_is_the_new_definition_for_\left:
1192
1193 \livechars@
1194
1195 \pdef\left#1{\left@#1}
1196

```

```

1197 \def\left@{\afterassignment\left@@\let\next=}
1198
1199 \def\left@@{\ifx\next\@stop\lnull\else
1200 \ifx\next|\delim@l_1\o@vert\else
1201 \ifx\next|\delim@l_1\o@Vert\else
1202 \ifx\next\vert\delim@l_1\o@vert\else
1203 \ifx\next\Vert\delim@l_1\o@Vert\else
1204 \ifx\next\ch@rbrack\delim@l_1\o@rbrack\else
1205 \next
1206 \fi\fi\fi\fi\fi\fi}
1207
1208 %_Here_is_the_new_definition_for_\right:
1209
1210 \pdef\right#1{\right@#1}
1211
1212 \def\right@{\afterassignment\right@@\let\next=}
1213
1214 \def\right@@{\ifx\next\@stop\rnull\else
1215 \ifx\next|\delim@r_1\o@vert\else
1216 \ifx\next|\delim@r_1\o@Vert\else
1217 \ifx\next\vert\delim@r_1\o@vert\else
1218 \ifx\next\Vert\delim@r_1\o@Vert\else
1219 \ifx\next\ch@lbrack\delim@r_1\o@lbrack\else
1220 \next
1221 \fi\fi\fi\fi\fi\fi}
1222
1223 %_Here_is_the_new_definition_for_\middle
1224 %_(a_bug_fixed_21_Sept._2002_thanks_to_E.H._Lohse)
1225
1226 \pdef\middle#1{\mathrel{}}\middle@#1\mathrel{}}
1227
1228 \def\middle@#1{\def\next{#1}
1229 \ifx\next\@stop\else
1230 \ifx\next\o@vert\delim@m_1\o@vert\else
1231 \delim@m_1#1%
1232 \fi\fi}
1233
1234 \killchars@
1235
1236 %_Some_other_middle_delimiters:
1237
1238 \def\mid{\middle|}
1239
1240 %
1241 %_D_o_u_b_l_e
1242 %

```

```

1243
1244 \pdef\double{\afterassignment\double@@\let\next=}
1245
1246 \def\double@@{%
1247   \ifx\next\ch@lbrack\delim@l 2\o@lbrack\else
1248   \ifx\next\ch@langle\delim@l 2\o@langle\else
1249   \ifx\next\ch@rbrack\delim@r 2\o@rbrack\else
1250   \ifx\next\ch@rangle\delim@r 2\o@rangle\else
1251   \ifx\next|\delim@m 2\o@vert\else
1252   \ifx\next\vert\delim@m 2\o@vert\else
1253   \ifx\next/\delim@m 2/\else
1254   \ifx\next\backslash\delim@m 2\backslash\else
1255   \n@err{Missing delimiter}{\double must be followed by [,],<,> or |}
1256   \fi\fi\fi\fi\fi\fi\fi\fi}
1257
1258 \pdef\ldouble{\afterassignment\ldouble@@\let\next=}
1259
1260 \def\ldouble@@{\ifx\next\@stop\lnull\else
1261   \ifx\next|\delim@l 2\o@vert\else
1262   \ifx\next\vert\delim@l 2\o@vert\else
1263   \n@err{Missing delimiter}{\ldouble must be followed by |}\lnull
1264   \fi\fi\fi}
1265
1266 \pdef\rdouble{\afterassignment\rdouble@@\let\next=}
1267
1268 \def\rdouble@@{\ifx\next\@stop\rnull\else
1269   \ifx\next|\delim@r 2\o@vert\else
1270   \ifx\next\vert\delim@r 2\o@vert\else
1271   \n@err{Missing delimiter}{\rdouble must be followed by |}\rnull
1272   \fi\fi\fi}
1273
1274
1275 \def\Mid{\double|}
1276
1277 %
1278 %\triple
1279 %
1280
1281 \pdef\triple#1{\triple@#1}
1282
1283 \def\triple@{\afterassignment\triple@@\let\next=}
1284
1285 \def\triple@@{%
1286   \ifx\next\ch@lbrack\delim@l 3\o@lbrack\else
1287   \ifx\next\ch@langle\delim@l 3\o@langle\else
1288   \ifx\next\ch@rbrack\delim@r 3\o@rbrack\else

```

```

1289 \ifx\next\ch@rangle\delim@r_3\o@rangle\else
1290 \ifx\next|\delim@m_3\o@vert\else
1291 \ifx\next\vert\delim@m_3\o@vert\else
1292 \ifx\next\vert\delim@m_3\o@vert\else
1293 \ifx\next/\delim@m_3/\else
1294 \ifx\next\backslash\delim@m_3\backslash\else
1295 \n@err{Missing delimiter}{\triple must be followed by [,],<,> or |}
1296 \fi\fi\fi\fi\fi\fi\fi\fi\fi}
1297
1298 \pdef\ltriple#1{\ltriple@_#1}
1299
1300 \def\ltriple@{\afterassignment\ltriple@@\let\next=}
1301
1302 \def\ltriple@@{\ifx\next\@stop\lnull\else
1303 \ifx\next|\delim@l_3\o@vert\else
1304 \ifx\next\vert\delim@l_3\o@vert\else
1305 \n@err{Missing delimiter}{\triple must be followed by |}\lnull
1306 \fi\fi\fi}
1307
1308 \pdef\rrtriple#1{\rrtriple@_#1}
1309
1310 \def\rrtriple@{\afterassignment\rrtriple@@\let\next=}
1311
1312 \def\rrtriple@@{\ifx\next\@stop\rnull\else
1313 \ifx\next|\delim@r_3\o@vert\else
1314 \ifx\next\vert\delim@r_3\o@vert\else
1315 \n@err{Missing delimiter}{\rrtriple must be followed by |}\rnull
1316 \fi\fi\fi}
1317
1318 %
1319 %_N_e_s_t_e_d_d_e_l_i_m_i_t_e_r_s
1320 %
1321
1322 %_Here_is_a_count_to_count_nesting_of_delimiters
1323
1324 \newcount\ddelimlevel@
1325
1326 %_Missing_delimiters_checking
1327
1328 \def\rdelim@error{\n@err{Unmatched right delimiter}}%
1329 \rdelim@errhelp
1330 \ddelimlevel@=0}
1331
1332 \def\rdelim@errhelp{Delimiters must be balanced within groups
1333 and alignment cells.
1334 ^^JI am ignoring whatever is superfluous.}

```

```

1335
1336 \def\ldelim@error#1{\n@err{Unmatched \number#1 left delimiter(s)}%
1337 \ldelim@errhelp
1338 \\\ddcount@@=#1
1339 \loop\ifnum\ddcount@@>0\rnull\advance\ddcount@@-1\repeat}
1340
1341 \def\ldelim@errhelp{Delimiters must be balanced within groups
1342 and alignment cells.
1343 ^^JI am inserting ‘)’ for every missing left delimiter.
1344 ^^JLots of error messages may follow; better fix it before going on.}
1345
1346 \def\ldelim@warningcheck#1{\ifnum#1>0
1347 \n@warning{Unmatched \number#1 left delimiter(s)}%
1348 \fi}
1349
1350 \def\mdelim@error{\n@err{Misplaced \string\middle}%
1351 {This command must occur between a left and a right delimiter.
1352 ^^JDoesn’t, so I am ignoring it.}%
1353 \ddelimlevel@=0}
1354
1355 % Default mode of delimiters
1356
1357 \def\defaultdelims@{%
1358 \def\delim@l##1##2{\if##10\else\o@left##2\o@right.\fi}%
1359 \def\delim@r##1##2{\if##10\else\o@left##2\o@right.\fi}%
1360 \def\delim@m##1##2{\if##10\else\o@left##2\o@right.\fi}%
1361 }
1362
1363 \defaultdelims@
1364
1365 %
1366 % D i s p l a y d e l i m i t e r s
1367 %
1368
1369 % Displayed material is put into box registers numbered by \ddelim@count
1370 % starting from \firstddelim@no. All they are hboxes.
1371
1372 % Token registers with the same numbers contain material whose typesetting
1373 % is postponed. They may be:
1374 % (i) extensible tokens (left and middle; e.g., delimiters).
1375 % Typesetting of extensibles is postponed until their size is
1376 % known (after the same level right delimiter is found);
1377 % (ii) escape tokens = interspersed macros (such as \wall, \return, etc.).
1378 % Typesetting postponed until all box registers are ejected.
1379
1380 \newcount\ddelim@count

```

```

1381
1382 % \firstddelim@no is set by \setfirstddelim@no to the first unused
1383 % box and toks register pair.
1384 % Every \displaydelims@ calls \setfirstddelim@no.
1385
1386 \def\setfirstddelim@no{%
1387   \edef\firstddelim@no{\the\count14}% unused box register
1388   \ifnum\firstddelim@no<\the\count15%
1389     \edef\firstddelim@no{\the\count15}% unused toks register
1390   \fi}
1391
1392 % The commands to fill the hboxes are \startddelimbox@ and \finishddelimbox@.
1393
1394 \def\startddelimbox@{\hbox\bgroup\o@math
1395   \ifnum\ddelim@count<\insc@unt% if less than the insertion count
1396   \else\n@err{Formula too large}%
1397     {No free box to store the next chunk of displayed material.
1398     ^^JThe rest of the formula will be ignored.
1399     ^^JDivide big formulas into small parts.}%
1400   \o@math\egroup
1401   \fi
1402   \dcurrstyle@
1403   \mathopen{}}
1404 }
1405
1406 \def\finishddelimbox@{\mathclose{}}
1407 \o@math\egroup}
1408
1409 % To distinguish between extensibles and escape tokens, they start with
1410 % control sequence \ext@tok and \esc@tok, respectively.
1411 % The nth token register may be tested by
1412 %
1413 % \if\ext@tok\first@tok{n} yes \else no \fi
1414 %
1415 % etc.
1416
1417 \def\ext@tok{1}
1418 \def\esc@tok{2}
1419
1420 \def\@car#1#2\@nil{#1}% LaTeX's definition
1421 \def\@cdr#1#2\@nil{#2}% LaTeX's definition
1422 \def\@cadr#1#2#3\@nil{#2}
1423
1424 \def\first@tok#1{\expandafter\@car\the\toks#1\relax\@noexpand\@nil}
1425 \def\second@tok#1{\expandafter\@cadr\the\toks#1\relax\@noexpand\@nil}
1426 \def\tail@toks#1{\expandafter\@cdr\the\toks#1\relax\@noexpand\@nil}

```

```

1427
1428 \def\first@token#1{\expandafter\@car#1\relax\noexpand\@nil}
1429 \def\second@token#1{\expandafter\@cadr#1\relax\noexpand\@nil}
1430 \def\tail@tokens#1{\expandafter\@cdr#1\relax\noexpand\@nil}
1431
1432 % \displaydelims@ is called by \displayon@ to start display mode of
1433 % delimiters, which includes defining \delim@l, \delim@r and
1434 % \delim@m within displayed formulas and starting the first delimbox.
1435
1436 \def\displaydelims@{\global\setbox\sizebox@\delimstrut@
1437 \displaydefs@
1438 \setfirstddelim@no
1439 \ddelim@count=\firstddelim@no % the first dbx has this number
1440 \ddelimlevel@=0 %
1441 \def\@stack{\relax}% initiating \@stack
1442 \def\ht@stack{\relax}% initiating \ht@stack
1443 \def\dp@stack{\relax}% initiating \dp@stack
1444 \toks\number\ddelim@count={\ext@tok 0x}% void extensible token
1445 \put@{\number\ddelim@count}\@stack % store the number of the starting box
1446 \setbox\number\ddelim@count\startddelimbox@ % now inside ddelimbox
1447 }
1448
1449 \def\displaydefs@{%
1450 \let\delim@l=\ddelim@l
1451 \let\delim@m=\ddelim@m
1452 \let\delim@r=\ddelim@r}
1453
1454
1455 \def\ddelim@l#1#2{\mathopen{
1456 \finishddelimbox@ % now outside ddelimbox
1457 \put@{\the\ht\sizebox}\ht@stack % save height of sizebox
1458 \put@{\the\dp\sizebox}\dp@stack % save depth of sizebox
1459 \setbox\sizebox\delimstrut@ % set minimal size of delimiters
1460 \advance\ddelimlevel@ by 1
1461 \advance\ddelim@count by 1
1462 % left delimiter -> extensible token:
1463 \toks\number\ddelim@count={\ext@tok#1#2}%
1464 \put@{\number\ddelim@count}\@stack % store the number of the starting box
1465 \setbox\number\ddelim@count\startddelimbox@ % now inside ddelimbox
1466 }
1467
1468 \def\ddelim@m#1#2{%
1469 \ifnum\ddelimlevel@>-1
1470 \finishddelimbox@ % now outside ddelimbox
1471 \advance\ddelim@count by 1
1472 % middle delimiter -> extensible token:

```



```

1473 \toks\number\ddelim@count={\ext@tok#1#2}%
1474 \setbox\number\ddelim@count\startddelimbox@%_now_inside_ddelimbox
1475 \else
1476 \mdelim@error#2%
1477 \fi}
1478
1479 \def\ddelim@r#1#2{\ifnum\ddelimlevel@<1\rdelim@error\fi
1480 \finishddelimbox@%_now_outside_ddelimbox
1481 \advance\ddelimlevel@ by -1
1482 \ifnum\ddelimlevel@>-1%_if_not_error
1483 \unite@dbboxes#1#2%_unite_box_registers_on_this_delimlevel;
1484 %_append_#1_times_#2
1485 \fi
1486 \setbox0\copy\sizebox%_save_the_sizebox_in_box0,_then_let_it_grow:
1487 \sizebox@grow
1488 \advance\ddelim@count by 1
1489 %_empty_delimiter_>_extensible_token:
1490 \toks\number\ddelim@count={\ext@tok 0.}%_emptying_toks_ddelim@count
1491 \setbox\number\ddelim@count\startddelimbox@%_now_inside_ddelimbox
1492 %_eject_the_sizebox_as_stored_in_box0_--_for_placement_of_sub_and
1493 %_superscripts:
1494 \box0}
1495
1496
1497
1498 \def\checkleftdelims@{\ifnum\ddelimlevel@>0\ldelim@error{\ddelimlevel@}\fi}
1499
1500 \def\enddisplaydelims@{\checkleftdelims@
1501 \finishddelimbox@%_now_outside_ddelimbox
1502 \unite@dbboxes 0.%_unite_all_box_registers
1503 \eject@dbboxes
1504 }
1505
1506 %_Called_by_\delim@r,_the_command_\unite@dbboxes_runs_through_box_registers
1507 %_between_\f@ddelim_and_the_current_value_of_\ddelim@count..Collapsed
1508 %_into_a_single_hbox_is_every_contiguous_interval_of_hboxes,_interspersed
1509 %_with_extensible_elements_that_were_stored_in_token_registers_and_in_#1,
1510 %_adjusted_to_the_size_of_the_current_\ddelimstrutbox.
1511
1512 %_Two_global_counts_are_needed:
1513
1514 \newcount\ddcount@%_to_count_boxes_to_be_collapsed;_global
1515 \newcount\ddcount@@%_to_count_boxes_to_gather_the_former;_local
1516
1517 \def\unite@dbboxes#1#2{%_now_outside_ddelimbox;_#1#2=_the_right_delimiter
1518 \get@\f@ddelim\f@stack

```

```

1519 \global\ddcount@=\f@ddelim %_set_ddcount@_to_starting_position
1520 \ddcount@@=\f@ddelim %_set_ddcount@@_to_starting_position
1521 \advance\ddelim@count_1
1522 %_starting_box_number_ddcount@@
1523 \setbox\number\ddcount@@\hbox\bgroup %_now_inside_ddelimbox
1524 \g@loop\ifnum\ddcount@<\ddelim@count
1525 \if\ext@tok\first@tok{\number\ddcount@}\relax %_if_extensible_element
1526 \if0\second@tok{\number\ddcount@}\relax %_if_‘0’_then_do_nothing
1527 \else %_else_eject_the_resized_extensible
1528 \expandafter\size@\the\toks\number\ddcount@\relax
1529 \fi
1530 \unhbox\number\ddcount@ %_unbox_the_box
1531 \else
1532 \if\esc@tok\first@tok{\number\ddcount@}\relax %_else_if_escape_element
1533 \egroup %_finishing_box_number_ddcount@@;_now_outside_ddelimbox
1534 \advance\ddcount@@ by 1
1535 %_moving_toks_ddcount@_to_toks_ddcount@@_--_if_unequal
1536 \ifnum\ddcount@=\ddcount@@ \else
1537 \toks\number\ddcount@@=\expandafter{\the\toks\number\ddcount@}%
1538 \toks\number\ddcount@={\ext@tok_0.}%_emptying_toks_ddcount@
1539 \fi
1540 %_starting_box_ddcount@@:
1541 \setbox\number\ddcount@@\hbox\bgroup %_now_inside_ddelimbox
1542 \unhbox\number\ddcount@
1543 \else
1544 \n@err{Unexpected contents in toks\number\ddcount@}{Shocked? Me too.}%
1545 \fi
1546 \fi
1547 \global\advance\ddcount@ by 1
1548 \repeat
1549 \size@ \ext@tok#1#2 \delimtype@right\relax %_resized_right_delimiter
1550 \egroup %_now_outside_ddelimbox
1551 \toks\f@ddelim={\ext@tok_0.}%_emptying_toks_f@ddelim
1552 \ddelim@count=\ddcount@@}
1553
1554 %
1555 %_D_e_l_i_m_i_t_e_r_g_r_o_w_t_h
1556 %
1557
1558 \newdimen\delimincrement@
1559 \newcount\delimgrowth@
1560
1561 \def\delimgrowth{\afterassignment\delimgrowth@@\delimgrowth@}
1562
1563 \def\delimgrowth@@{\ifnum\delimgrowth@<1 \delimgrowth@=1
1564 \n@warning{\string\delimgrowth\space must be a positive natural number}%

```

```

1565 \fi
1566 \delimincrement@=.66ex
1567 \divide\delimincrement@_by_\delimgrowth@}
1568
1569 \def\sizebox@grow{\@tempdima=\ht\sizebox
1570 \advance\@tempdima\delimincrement@_%\relax
1571 \ht\sizebox=\@tempdima
1572 \@tempdima=\dp\sizebox
1573 \advance\@tempdima\delimincrement@_%\relax
1574 \dp\sizebox=\@tempdima
1575 \get@{\@tempa\ht@stack
1576 \ifdim\the\ht\sizebox<\@tempa_\ht\sizebox=\@tempa\fi
1577 \get@{\@tempa\dp@stack
1578 \ifdim\the\dp\sizebox<\@tempa_\dp\sizebox=\@tempa\fi
1579 }
1580
1581 % Called by the last \delim@r, the command \eject@dboxes ejects all the
1582 % box and token registers filled. Uses the global count \ddcount@
1583
1584 \newcount\ddcount@_%\global
1585
1586 \def\eject@dboxes{\global\ddcount@=\firstddelim@no{}}%
1587 \box\number\ddcount@
1588 \g@loop\ifnum\ddcount@<\ddelim@count
1589 \global\advance\ddcount@_by_1
1590 \if\ext@tok\first@tok{\number\ddcount@}\relax
1591 \n@err{Forgotten extensible \number\ddcount@\space}%
1592 {An internal error, induced by the previous errors.
1593 ^^JSomething will be lost.}
1594 \else
1595 \if\esc@tok\first@tok{\number\ddcount@}\relax
1596 \tail@toks{\number\ddcount@}\relax
1597 \else\n@err{Unable to eject \number\ddcount@}%
1598 {Sorry, the box or toks have never been filled.
1599 ^^JIs an internal error and should never happen.}%
1600 \fi
1601 \fi
1602 \box\number\ddcount@
1603 \repeat}
1604
1605 %
1606 % Siz_i_n_g_d_e_l_i_m_i_t_e_r_s
1607 %
1608
1609 % The following commands are called by \unite@dboxes.
1610 % Parameters:

```

```

1611 %
1612 % #1 = always \ext@tok, hence ignored
1613 % if #2 = ":" then sizable fraction
1614 % #3 = numerator and #4 = denominator
1615 % otherwise
1616 % #2 = number of repetitions (from 0 to 9),
1617 % #3 = a delimiter
1618 % #4 = a type (\delimtype@right or \relax)
1619
1620 \def\size@#1#2#3#4{%
1621   \if:#2\relax% if a numeric fraction
1622     \o@math\size@frac{#3}{#4}\relax\o@math
1623   \else% else a delimiter
1624     \if0#2\relax% zero repetitions -- do nothing
1625     \else
1626       \ifx#4\delimtype@right% if right delimiter, set sizebox
1627       \setbox0\hbox{\o@math\extend@delim#2#3\sizebox\o@math}%
1628       %\ht\sizebox=\ht0\dp\sizebox=\dp0%
1629       \box0%
1630     \else
1631       \o@math\extend@delim#2#3\sizebox\o@math
1632     \fi
1633   \fi
1634 }
1635
1636 %
1637 % Extending delimiters
1638 %
1639
1640 % Not all expressions have their height equal to depth. So we put
1641 % the expression in a vcenter, create delimiters that match the vcenter,
1642 % and then shift the delimiter vertically the appropriate amount.
1643
1644 % A surprise was that [ sometimes acquired bigger size than (.
1645 % So I had to modify the procedure: first extend [, then (.
1646
1647 % The three arguments to \extend@delim are:
1648 % #1 = the number of repetitions
1649 % #2 = a delimiter
1650 % #3 = a box register of zero width, or -1 to indicate base size
1651
1652 % Setting values of \delimiterfactor and \delimitershortfall such that
1653 % \delimfactor works well:
1654
1655 \delimiterfactor=920
1656 \delimitershortfall=3pt

```

```

1657
1658 %_Not_all_expressions_have_their_height_equal_to_depth._So_we_put
1659 %_the_expression_in_a_vcenter,_create_delimiters_that_match_the_vcenter,
1660 %_and_then_shift_the_delimiter_vertically_the_appropriate_amount.
1661
1662 %_A_surprise_was_that_[sometimes_acquired_bigger_size_than_(.
1663 %_So_I_had_to_modify_the_procedure:_first_extend_[,_then_(.
1664
1665 %_The_three_arguments_to_\extend@delim_are:
1666 %_#1=_the_number_of_repetitions
1667 %_#2=_a_delimiter
1668 %_#3=_a_box_register_of_zero_width,_or_-1_to_indicate_base_size
1669
1670 \def\extend@delim#1#2#3{%
1671   \ifnum#1<1
1672     %_do_absolutely_nothing
1673   \else\begin{group}%_do_box0=_extended_delimiter
1674     \nulldelimiterspace=0pt
1675     \ifnum#3<0.%_if_#3_not_a_box_register
1676       \setbox0\hbox{\o@math\icurrstyle@{\o@left#2\o@right.\o@math}%
1677       \@tempdima=0pt
1678     \else.%_if_#3=_box_register
1679       \setbox\@tempboxa\hbox{\o@math\vcenter{\copy#3}\o@math}%
1680       \@tempdima=\ht\@tempboxa.%_hbox{the\@tempdima/the\dp\@tempboxa}%
1681       \ifdim\@tempdima>3\mex\checkangle@{#2}%
1682       \ifresult@{angle_brackets_do_not_grow_that_size}\fi
1683     \fi
1684     \advance\@tempdima_-\ht#3
1685     \setbigstrutbox@
1686     \setbox0\hbox{\o@math\icurrstyle@{\o@left#2
1687     \ifdim\ht\@tempboxa>.86\ht\bigstrut@box
1688       \vrule_height\ht\bigstrut@box_width_0pt
1689     \fi
1690     \ifdim\dp\@tempboxa>.86\dp\bigstrut@box
1691       \vrule_depth\dp\bigstrut@box_width_0pt
1692     \fi
1693     \box\@tempboxa\o@right.\o@math}%
1694     \fi.%_now_copy_box0_#1_times
1695     \count@=1
1696     \loop\ifnum\count@<#1
1697       \lower\@tempdima\copy0
1698       \hskip-.75\wd0\hskip.25\mex
1699       \advance\count@_1
1700     \repeat
1701     \lower\@tempdima\box0
1702   \endgroup

```

```

1703 \fi}
1704
1705 %_Check_for_an_angle_bracket
1706
1707 \def\checkangle@#1{\def\@tempa{#1}
1708 \def\@tempb{\o@langle}
1709 \ifx\@tempa\@tempb\result@true
1710 \else
1711 \def\@tempb{\o@rangle}
1712 \ifx\@tempa\@tempb\result@true
1713 \else
1714 \result@false
1715 \fi\fi}
1716
1717 %
1718 %_E_s_c_a_p_e_c_o_m_m_a_n_d_s
1719 %
1720
1721 %_Escape_commands_are_ones_that,_if_not_stored,_would_interfere_with_the
1722 %_display_mode.
1723
1724 \def\wall@cr{\checkpunct@
1725 \ifpunct@\global\punct@false
1726 \ifnum\ddelimlevel@>0\%_elements_of_a_list
1727 \store@ec{\d@cr{\pad@}}{\}%_padded
1728 \mathopen{}\}%_new_expression
1729 \else\%_separate_equations
1730 \store@ec{\d@cr{\relax}}{\}%_unpadded
1731 \mathopen{}\}%_new_expression
1732 \fi
1733 \else\%_broken_formula
1734 \store@ec{\d@cr{\pad@}}{\}%_padded
1735 \mkern-\thickmuskip\mathinner{}\}%_continuing_expression
1736 \fi}
1737
1738 \def\curr@cr@is@wall@cr{\def\curr@cr{\wall@cr}\let\\\curr@cr}
1739
1740 \def\wall{\mathrel{}}
1741 \ifwallallowed@
1742 \ifdisplay@
1743 \store@ec{\d@wall{0}}{\let\\\wall@cr}%
1744 \else
1745 \n@warning{Non-display. I am ignoring the misplaced \string\wall}%
1746 \fi
1747 \else\n@err{Misplaced \string\wall}{\wall is disallowed here}%
1748 \fi

```

```

1749   \mathopen{}
1750 }
1751
1752
1753 \def\return{\checkpunct@
1754   \ifdisplay@
1755     \store@ec{\d@return}{\let\\curr@cr}
1756   \else
1757     \n@warning{Non-display. I am ignoring the misplaced \string\return}%
1758   \fi
1759   \ifpunct@ \global\punct@false
1760   \mathopen{}
1761   \else
1762     \mkern-\thickmuskip \mathinner{}
1763   \fi
1764 }
1765
1766
1767 % \padded is another form of \wall.
1768 % \padded{A} prefixes each line except the first with A.
1769 % Typically A is a void box or a kern.
1770 % Nested \padded have cumulative effect.
1771
1772 \def\padded#1{%
1773   \ifwallallowed@
1774   \ifdisplay@
1775     \store@ec{\d@wall{1#1}}{\let\\wall@cr}%
1776   \else
1777     \n@warning{Non-display. I am ignoring the misplaced \string\padded}%
1778   \fi
1779   \else \n@err{Misplaced \string\padded}{\padded is disallowed here}%
1780   \fi
1781   \mathopen{}
1782 }
1783
1784 \def\pad@{}
1785
1786
1787 % \store@ec is the generic command to store an escape command #1 in token
1788 % registers. It also performs #2 while outside ddelimbox.
1789
1790 \def\store@ec#1#2{\finishddelimbox@ % now outside ddelimbox
1791   \advance\ddelim@count 1
1792   \toks\number\ddelim@count={\esc@tok#1}% #1 -> escape token
1793   #2% keep % here
1794   \setbox\number\ddelim@count\startddelimbox@ % now inside ddelimbox

```

```

1795 }
1796
1797
1798 %
1799 %\Inlinedelimiters
1800 %
1801
1802 \newcount\big@ \big@=0
1803 \newcount\big@@ \big@@=0
1804 \newbox\bigstrut@box
1805
1806 \mathchardef\biglbracket@="0302%%\biglbracket@_is_of_fixed_size_in_LaTeX!!
1807
1808 \def\setbigstrutbox@{\setbox\bigstrut@box
1809 \hbox{\o@math\vcenter{\hbox{\o@math\icurrstyle@
1810 \mathchar\biglbracket@\o@math}}\o@math}
1811 \setbox\bigstrut@box\hbox{\vrule height\prorated@ht\bigstrut@box
1812 depth\prorated@dp\bigstrut@box
1813 width_0pt}
1814 }
1815
1816 \pdef\big{\advance\big@_1\relax}
1817 \pdef\bigg{\advance\big@_2\relax}
1818 \pdef\biggg{\advance\big@_3\relax}
1819
1820 \def\bigl{\big\left}
1821 \def\biggl{\bigg\left}
1822
1823 \let\bigm=\middle
1824 \let\biggm=\middle
1825
1826 \let\big r=\right
1827 \let\biggr=\right
1828
1829
1830 %_inline_mode
1831
1832 \def\inlinedelims@{%
1833 \idelimlevel@=0\relax
1834 \big@=0\relax
1835 \big@@=0\relax
1836 \let\delim@l=\idelim@l
1837 \let\delim@m=\idelim@m
1838 \let\delim@r=\idelim@r
1839 }
1840

```



```

1841 \def\idelim@l#1#2{\mathopen{
1842   \nodisplay@true
1843   \advance\idelimlevel@ by 1
1844   \ifnum\big@>0 \advance\big@@\big@
1845   \ifnum\idelimlevel@>\big@@ \n@err{Misplaced \string\big}
1846   \ifnum\big@>0 \n@err{Too late for \big -- a big must not occur inside a non-big}
1847   \fi
1848   \ifnum\idelimlevel@<1 \n@err{Misplaced \string\big}
1849   \ifnum\big@>0 \n@err{\big must not occur on negative level of fencing.}
1850   \fi
1851   \fi
1852   \big@=0
1853   \ifnum\idelimlevel@>\big@@ \extend@delim#1#2{-1} \normal_size
1854   \else
1855   \ifnum\idelimlevel@<1 \extend@delim#1#2{-1} \normal_size
1856   \else
1857   \setbigstrutbox@ \extend@delim#1#2\bigstrut@box
1858   \fi
1859   \fi
1860   \mathopen{}}
1861
1862 \def\idelim@m#1#2{\mathclose{
1863   \nodisplay@true
1864   \big@=0
1865   \ifnum\idelimlevel@>\big@@ \extend@delim#1#2{-1} \normal_size
1866   \else
1867   \ifnum\idelimlevel@<1 \extend@delim#1#2{-1} \normal_size
1868   \else
1869   \setbigstrutbox@ \extend@delim#1#2\bigstrut@box
1870   \fi
1871   \fi
1872   \mathclose{}}
1873
1874 \def\idelim@r#1#2{\mathclose{
1875   \big@=0
1876   \ifnum\idelimlevel@>\big@@ \extend@delim#1#2{-1} \normal_size
1877   \else
1878   \ifnum\idelimlevel@<1 \extend@delim#1#2{-1} \normal_size
1879   \else
1880   \setbigstrutbox@ \extend@delim#1#2\bigstrut@box
1881   \advance\big@@-1
1882   \fi
1883   \fi
1884   \advance\idelimlevel@ by -1
1885   \mathclose{}}
1886

```

```

1887 %
1888 %\Auxiliary\proceedures
1889 %
1890 \def\replacebindelims@#1#2{\begingroup
1891 \idelimlevel@=0\relax
1892 \def\delim@l##1##2{#2\advance\idelimlevel@ by 1
1893 \setbox0\hbox\bgroup\o@math}%
1894 \def\delim@r##1##2{\mathclose{}\advance\idelimlevel@ by -1
1895 \o@math\egroup}%
1896 \def\delim@m##1##2{}%
1897 \def\inlineopen@{#2\advance\idelimlevel@ by 1
1898 \setbox0\hbox\bgroup\o@math}%
1899 \def\inlineclose@{\mathclose{}\advance\idelimlevel@ by -1
1900 \o@math\egroup}%
1901 #1
1902 \endgroup}
1903
1904 %
1905 %\Subscripts_and_superscripts
1906 %
1907
1908 \let\o@sp^
1909 \let\o@sb_%(MathTime_macros_destroy_plain_TeX's\sp,\sb)
1910
1911 \catcode'\^=13
1912 \catcode'\_ =13
1913
1914 \pdef_#1{\o@sb{\display@false\advance\mathcount@_1\inline{#1}}}}
1915
1916 \pdef^#1{\o@sp{\display@false\advance\mathcount@_1\inline{#1}}}}
1917
1918 \catcode'\^=12
1919 \catcode'\_ =12
1920
1921 %
1922 %\Parsing_of_sub_and_superscripts
1923 %
1924
1925 %The comand \parse@ detects whether sub- or superscripts follow.
1926 %If yes, then \sb@true or \sp@true is set and the arguments
1927 %are stored in \sb@toks or \sp@toks, respectively.
1928 %Then \afterparse@ is executed.
1929
1930 \newtoks\sp@toks
1931 \newtoks\sb@toks
1932

```

```

1933 \newif\ifsb@
1934 \newif\ifsp@
1935
1936 \def\parse@{\sb@false\sp@false
1937 \def\next@comm{\afterassignment\parse@@\let\next=}
1938 \next@comm}
1939
1940 \def\parse@@{%
1941 \ifx\next_
1942 \ifsb@\n@err{Double_subscript}{The notation x_y_z is ambiguous.}
1943 \else\sb@true
1944 \fi
1945 \def\next@comm{\sb@@}
1946 \else
1947 \ifx\next^
1948 \ifsp@\n@err{Double_superscript}{The notation x^y^z is ambiguous.}
1949 \else\sp@true
1950 \fi
1951 \def\next@comm{\sp@@}
1952 \else
1953 \def\next@comm{\afterparse@}
1954 \fi
1955 \fi
1956 \next@comm}
1957
1958 \def\sp@@#1{\sp@toks={#1}\afterassignment\parse@@\let\next=}
1959
1960 \def\sb@@#1{\sb@toks={#1}\afterassignment\parse@@\let\next=}
1961
1962 \def\parse@next{\parse@\next}
1963
1964 %
1965 %_O_p_e_r_a_t_o_r_s
1966 %
1967
1968 %\mathop_is_redefined_to_stop_misinterpretation_of_following_Bins
1969 %as_unary_operators(cf.TeXbook,p.170).
1970
1971 \let\o@mathop\mathop
1972
1973 %The_following_definition_determines_spacing_between_Op_and_Bin.
1974 %According_to[TeXBook,p.170],“such_case_never_arises,
1975 %so_plain_TeX_leaves_it_undefined,making_the_Bin_into_unary.”)
1976
1977 \newif\iflimits@
1978 \limits@true

```

```

1979
1980 \pdef\mathop#1{%
1981   \ifnum\mathcount@>0\_%_in_sub_and_superscripts
1982   \def\next@comm{\o@mathop{#1}}\_%_just_@mathop
1983   \else\def\mathop@arg{#1}
1984   \def\afterparse@{\mathop@@}
1985   \sb@false\sp@false
1986   \ifdisplay@\limits@true\else\limits@false\fi
1987   \def\next@comm{\afterassignment\mathop@let\next=}
1988   \fi
1989   \next@comm}
1990
1991 \def\mathop@{\def\next@comm{\parse@next}
1992   \ifx\next\limits
1993   \ifdisplay@\limits@true
1994   \else\iflimits@\else\n@warning{Ignoring inline \string\limits}\fi
1995   \fi
1996   \def\next@comm{\parse@}
1997   \else
1998   \ifx\next\nolimits\limits@false\def\next@comm{\parse@}\fi
1999   \fi
2000   \next@comm}
2001
2002 \def\mathop@@{\mathoptest@_%_sets\ifresult@_true_if_a_left_delimiter_follows
2003   \ifresult@
2004   \iflimits@
2005   \o@mathop{\mathop@arg}\mathop@@@1
2006   \else
2007   \o@mathop{\mathop@arg}\nolimits\mathop@@@
2008   \fi
2009   \else
2010   \iflimits@
2011   \mathinner{\o@mathop{\mathop@arg}\mathop@@@1}
2012   \else
2013   \mathinner{\mathop@arg}\mathop@@@
2014   \fi
2015   \fi
2016   \next}
2017
2018
2019 \catcode'\^ =13
2020 \catcode'\_ =13
2021
2022 \def\mathop@@@{%
2023   \ifsp@
2024   ~{\hbox{\edef\@tempa{\noexpand\imath@{\the\sp@toks}}}%

```

```

2025 \def\{\,\}\@tempa}}
2026 \fi
2027 \ifsb@
2028 \_ {\hbox{\edef\@tempa{\noexpand\imath@{\the\sb@toks}}}%
2029 \def\{\,\}\@tempa}}
2030 \fi}
2031
2032 \def\mathop@@@1{\limits
2033 \ifsp@ {\lmathop@@@1@{\the\sp@toks}} \fi
2034 \ifsb@ {\lmathop@@@1@{\the\sb@toks}} \fi}
2035
2036 \def\lmathop@@@1@#1{\vbox{\let\=\crrc
2037 \baselineskip=0pt \lineskip=2pt
2038 \edef\@tempa{\vbox{\noexpand\ialign{%
2039 \hfil\noexpand\imath@{####}\hfil\crrc
2040 #1.\crrc}}}}
2041 \@tempa}}
2042
2043 \catcode'\^=12
2044 \catcode'\_ =12
2045
2046
2047 \catcode'\(=13 \catcode'\ [=13 \catcode'\<=13
2048
2049 \newif\iftesting@
2050 \testing@false
2051
2052 \def\mathoptest@{%
2053 \iftesting@
2054 \result@true
2055 \else
2056 \result@false
2057 \ifx\next\ch@lparenthesis\result@true \else
2058 \ifx\next\ch@lbrack\result@true \else
2059 \ifx\next<\result@true \else
2060 \ifx\next\{\result@true \else
2061 \ifx\next\left\result@true \else
2062 \ifx\next\langle\result@true \else
2063 \ifx\next\lfloor\result@true \else
2064 \ifx\next\lceil\result@true \else
2065 \ifx\next\mathopen\result@true
2066 \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
2067 \fi}
2068
2069 %\lvert and \lVert are intentionally omitted
2070

```

```

2071 \catcode'\(=12\catcode'\[=12\catcode'\<=12
2072
2073 %
2074 %_Abbreviations
2075 %
2076 \newcount\abbrevlength@
2077
2078 \pdef\abbreviation{\def\abbrev@{\abbrevlength@=0
2079 \def\abbrev@@{\afterassignment\abbrev@\let\abbrev@next=}%
2080 \result@false\abbrev@@}
2081
2082 \long\def\abbrev@{%
2083 \ifx'\abbrev@next\result@false
2084 \else
2085 \edef\next{\meaning\abbrev@next}
2086 \expandafter\letter@test\next\endletter@test
2087 \fi
2088 \ifresult@
2089 \edef\abbrev@@{\abbrev@@\theletter@}
2090 \advance\abbrevlength@1\relax
2091 \else
2092 \ifnum\abbrevlength@>1
2093 \ifnum\mathcount@>0\o@mathop\bgroup
2094 \else\mathinner\bgroup
2095 \fi
2096 \else\bgroup
2097 \fi
2098 {\rm\abbrev@\kern0pt}
2099 \def\abbrev@@{\egroup\result@false
2100 \mathclose{}\mathopen{}\mathop{}\nolimits\abbrev@next}
2101 \fi
2102 \abbrev@@}
2103
2104 \def\letter@test#1#2#3#4#5\endletter@test{
2105 \ifl#4\result@true\letter@test#5
2106 \else\result@false\fi}
2107
2108 \def\letter@test@#1#2#3#4#5#6{\def\theletter@{#6}}
2109
2110 %
2111 %_Special symbols
2112 %
2113
2114 %_Inequalities
2115
2116 %\let\leq=\le_ \let\geq=\ge_

```

```

2117 %\let\leqq=\le\let\geqq=\ge
2118
2119 %_factorial
2120
2121 \def\factorial{\mc@factorial\mathopen{}\mathinner{}}
2122
2123 %_vingl
2124
2125 \pdef\vin{\mathrel{\hbox{\hglue.1\mex
2126 \vrule\@height.06\mex\@width.1\mex
2127 \vrule\@height.1.33\mex\@width.06\mex
2128 \hglue.4\mex}}}
2129
2130 \pdef\niv{\mathrel{\hbox{\hglue.2\mex
2131 \vrule\@height.1.33\mex\@width.06\mex
2132 \vrule\@height.06\mex\@width.1\mex
2133 \hglue.5\mex}}}
2134
2135 \def\stackrel#1#2{\mathrel{\limits@true\mathop{#2}\limits^{\rm #1}}}%
2136 %%%%%%%%%%%
2137 \makerobust\stackrel
2138
2139 %
2140 %_E_x_p_a_n_d_a_b_l_e_b_a_r_s_a_n_d_a_r_r_o_w_s
2141 %
2142
2143 %_Save_even_if_not_needed
2144
2145 \let\o@overline=\overline
2146 \let\o@underline=\underline
2147
2148 \newdimen\er@wd
2149
2150 \def\er@sep{.06ex}
2151 \def\er@gap{.33\mex}
2152 \def\er@short{.6\mex}
2153 \def\er@rulewd{.05ex}
2154 \def\er@minwd{.6\mex}
2155 \def\er@kerna{.15\mex}
2156 \def\er@kernb{.15\mex}
2157
2158 \def\overline#1{\setmathtype@{#1}%
2159 {\o@er@{#1}\leaders\hrule\@height\er@rulewd\hfill}}
2160 }
2161 \def\underline#1{\setmathtype@{#1}%
2162 {\u@er@{#1}\leaders\hrule\@height\er@rulewd\hfill}}

```

```

2163 }
2164 \def\overrightarrow#1{\setmathtype@{#1}%
2165   {\o@er@{#1}}{\o@math\iscriptstyle@_\longrightarrowfill\o@math}}
2166 }
2167 \def\underrightarrow#1{\setmathtype@{#1}%
2168   {\u@er@{#1}}{\o@math\iscriptstyle@_\longrightarrowfill\o@math}}
2169 }
2170 \def\overleftarrow#1{\setmathtype@{#1}%
2171   {\o@er@{#1}}{\o@math\iscriptstyle@_\longleftarrowfill\o@math}}
2172 }
2173 \def\underleftarrow#1{\setmathtype@{#1}%
2174   {\u@er@{#1}}{\o@math\iscriptstyle@_\longleftarrowfill\o@math}}
2175 }
2176 \def\overleftrightharrow#1{\setmathtype@{#1}%
2177   {\o@er@{#1}}{\o@math\iscriptstyle@_\longleftrightharrowfill\o@math}}
2178 }
2179 \def\underleftrightharrow#1{\setmathtype@{#1}%
2180   {\u@er@{#1}}{\o@math\iscriptstyle@_\longleftrightharrowfill\o@math}}
2181 }
2182
2183 %_Inside
2184
2185 \pdef\o@er@#1#2{\inlineopen@
2186   \begingroup
2187   \setbox0\currstyle@hbox{\toprestricted@true_#1}
2188   \er@wd=\wd0_\advance\er@wd-\er@short
2189   \ifdim\er@wd<\er@minwd_\er@wd=\er@minwd_\fi
2190   \kern\er@kerna
2191   \hbox_to\wd0{\hss
2192     \vbox{\offinterlineskip
2193       \vglue\er@sep
2194       \hbox_to\er@wd{#2}%
2195       \vskip\er@gap
2196       \hbox_to\er@wd{\hss\box0\hss}}}%
2197   \hss}
2198   \kern\er@kernb
2199   \endgroup
2200   \inlineclose@}
2201
2202 \pdef\u@er@#1#2{\inlineopen@
2203   \begingroup
2204   \setbox0\currstyle@hbox{\botrestricted@true_#1}
2205   \er@wd=\wd0_\advance\er@wd-\er@short
2206   \ifdim\er@wd<\er@minwd_\er@wd=\er@minwd_\fi
2207   \kern\er@kerna
2208   \hbox_to\wd0{\hss

```



```

2209 \vtop{\offinterlineskip
2210 \hbox\to\er@wd{\hss\box0\hss}
2211 \vskip\er@gap
2212 \hbox\to\er@wd{#2}%
2213 \vglue\er@sep}%
2214 \hss}
2215 \kern\er@kernb
2216 \endgroup
2217 \inlineclose@}
2218
2219 \def\longrightrightarrowfill{\axis@@\hfill\mskip-6mu\rightrightarrow}
2220 \def\longleftarrowfill{\leftarrow\mskip-6mu\axis@@\hfill}
2221 \def\longlefttrightarrowfill{\leftarrow\mskip-6mu
2222 \axis@@\hfill\mskip-6mu\rightrightarrow}
2223
2224 %_Setting_math_type
2225
2226 \def\setmathtype@#1#2{
2227 \setbox0\hbox{\o@math\setmathtype@@@000 x#1x\o@math}
2228 \@tempdima=\wd0
2229 \setbox0\hbox{\o@math\setmathtype@@@100 x#1x\o@math}
2230 \ifdim\wd0>\@tempdima \o@mathop{#2}
2231 \else \setbox0\hbox{\o@math\setmathtype@@@010 x#1x\o@math}
2232 \ifdim\wd0>\@tempdima \mathrel{#2}
2233 \else \setbox0\hbox{\o@math\setmathtype@@@001 x#1x\o@math}
2234 \ifdim\wd0>\@tempdima \mathbin{#2}
2235 \else \mathord{#2}
2236 \fi
2237 \fi
2238 \fi}
2239
2240 \def\setmathtype@@@#1#2#3{\thinmuskip=#1mu \thickmuskip=#2mu \medmuskip=#3mu
2241 \relax}
2242
2243 %
2244 %_M_u_l_t_i_p_l_e_a_n_d_e_x_t_e_n_s_i_b_l_e_a_c_c_e_n_t_s
2245 %
2246
2247 %_Extensible_accents:
2248
2249 \let\o@hat=\hat
2250 \let\o@widehat=\widehat
2251
2252 \let\o@tilde=\tilde
2253 \let\o@widetilde=\widetilde
2254

```

```

2255 \let\o@bar=\bar
2256
2257 \def\widebar#1{\ifdim\wd0<\prorated@_em\mathaccent"07B_{#1}
2258 \else\mathaccent"07C_{#1}
2259 \fi}
2260
2261 %Limits_of_extensibility:
2262 %
2263 %_narrow_accent
2264 %_threshold_=\widethr@
2265 %_wide_accent
2266 %_threshold_=\wrapthr@
2267 %_attached_accent
2268
2269 \def\widethr@{1.6ex}
2270 \def\wrapthr@{5.8\mex}
2271
2272 %_Non-extensible_accents
2273
2274 \let\o@dot=\dot
2275 \let\o@ddot=\ddot
2276 \let\o@breve=\breve
2277 \let\o@check=\check
2278
2279 \def\uo{\mathaccent"017_}
2280
2281 %_Multiple_accents
2282
2283 \newtoks\acc@toks_%_toks_to_store_a_sequence_of_accents_in_reverse_order
2284
2285 \newif\ifextacc@
2286
2287 \pdef\hat{\acc@toks={\H@}\extacc@true\acc@@}
2288 \pdef\tilde{\acc@toks={\T@}\extacc@true\acc@@}
2289 \pdef\bar{\acc@toks={\B@}\extacc@true\acc@@}
2290 \pdef\dot{\acc@toks={\D@}\extacc@false\acc@@}
2291 \pdef\ddot{\acc@toks={\DD@}\extacc@false\acc@@}
2292 \pdef\breve{\acc@toks={\BR@}\extacc@false\acc@@}
2293 \pdef\check{\acc@toks={\CH@}\extacc@false\acc@@}
2294
2295 %_Defaults_are_printable_(for_debugging_purposes)
2296
2297 \def\H@{H}\def\T@{T}\def\B@{B}
2298 \def\D@{D}\def\DD@{DD}
2299 \def\BR@{BR}\def\CH@{CH}
2300

```

```

2301 % See TeXbook p. 374 for the trick with \expandafter:
2302
2303 \def\acc@@#1{\def\next@comm{\acc@@}\def\@tempa{#1}\def\@tempb{\hat}
2304 \ifx\@tempa\@tempb
2305 \acc@toks=\expandafter{\expandafter\H@the\acc@toks}
2306 \else\def\@tempb{\tilde}
2307 \ifx\@tempa\@tempb
2308 \acc@toks=\expandafter{\expandafter\T@the\acc@toks}
2309 \else\def\@tempb{\bar}
2310 \ifx\@tempa\@tempb
2311 \acc@toks=\expandafter{\expandafter\B@the\acc@toks}
2312 \else\def\@tempb{\dot}
2313 \ifx\@tempa\@tempb
2314 \acc@toks=\expandafter{\expandafter\D@the\acc@toks}
2315 \extacc@false
2316 \else\def\@tempb{\ddot}
2317 \ifx\@tempa\@tempb
2318 \acc@toks=\expandafter{\expandafter\DD@the\acc@toks}
2319 \extacc@false
2320 \else\def\@tempb{\breve}
2321 \ifx\@tempa\@tempb
2322 \acc@toks=\expandafter{\expandafter\BR@the\acc@toks}
2323 \extacc@false
2324 \else\def\@tempb{\check}
2325 \ifx\@tempa\@tempb
2326 \acc@toks=\expandafter{\expandafter\CH@the\acc@toks}
2327 \extacc@false
2328 \else\def\next@comm{\acc@@{#1}}
2329 \fi
2330 \fi
2331 \fi
2332 \fi
2333 \fi
2334 \fi
2335 \fi
2336 \next@comm}
2337
2338 \def\acc@@@#1{
2339 \inlineopen@
2340 \setbox0\currstyle@hbox{#1}
2341 \ifdim\wd0>\wrapthr@%long
2342 \wrap@@@acc{#1}
2343 \else
2344 \checkcompound@{#1}%#1=accented material
2345 \ifcompound@%not a single character
2346 \ifextacc@

```

```

2347 \ifdim\wd0>\widethr@ \wide@@@acc{#1}
2348 \else \@@@acc{#1}
2349 \fi \acc@kern
2350 \else \wrap@@@acc{#1}
2351 \fi
2352 \else %single_character
2353 \ifdim\wd0>\widethr@ \wide@@@acc{#1}
2354 \else \@@@acc{#1}
2355 \fi \acc@kern
2356 \fi
2357 \fi
2358 \inlineclose@}
2359
2360 \def\acc@kern_{\mkern1.2mu }
2361
2362 %Checking_if_single_character
2363
2364 \newif\ifcompound@
2365
2366 \def\checkcompound@#1{\compound@false
2367 \edef\fdxxii@textfontii{\the\fontdimen22\textfont2}%
2368 \fontdimen22\textfont2=300pc
2369 \setbox\@tempboxa\hbox{\o@math\defaultdelims@
2370 \def\frac{xx\@gobbletwo}
2371 #1\o@math}
2372 \@tempdima=\ht\@tempboxa
2373 \setbox\@tempboxa\hbox{\o@math\defaultdelims@
2374 \def\frac{xx\@gobbletwo}
2375 \o@mathop{#1}\o@math}
2376 \ifdim\ht\@tempboxa=\@tempdima
2377 \compound@true
2378 \fi
2379 \fontdimen22\textfont2=\fdxxii@textfontii
2380 }
2381
2382
2383 %Attaching_accents_to_#1,_putting_parentheses_around_if_necessary.
2384
2385 \def\wrap@@@acc#1{
2386 \setbox\@tempboxa\currstyle@hbox{\nodisplay@false
2387 \replacebindelims@{#1}{x}}
2388 \ifdim\wd\@tempboxa>2\mex
2389 \ifdisplay@ \currstyle@hbox{(#1)} \else (\inline{#1}) \fi
2390 \samesize@{\wrap@@@acc@}
2391 \else
2392 \ifdisplay@ \currstyle@hbox{#1} \else \inline{#1} \fi

```

```

2393 \samesize@{\wrap@@@acc@}
2394 \fi
2395 }
2396
2397 \def\wrap@@@acc@{\begingroup
2398 \def\H@{\land}\def\T@{\sim}\def\B@{-}
2399 \def\D@{\raise.5\mex\hbox{\bf.}}\def\DD@{\raise.5\mex\hbox{\bf..}}
2400 \def\BR@{\smile}\def\CH@{\lor}
2401 \the\acc@toks\endgroup}
2402
2403 %_Stacked_accents
2404
2405 \newdimen\xheight@
2406
2407 \def\acc@def#1#2#3#4{\def#1{\fontdimen5_#4=\@tempdima
2408 \ifcompound@_%_if_compound
2409 \rlap{\o@math#2{\currstyle@hbox{#3}}\o@math}
2410 \else_%_if_single_character
2411 \rlap{\currstyle@hbox{#2{#3}}}
2412 \fi
2413 \advance\@tempdima\@tempdimb}}
2414
2415 \def\xacc@def#1#2#3#4{\def#1{\begingroup
2416 \advance\@tempdima 1.5\@tempdimb
2417 \fontdimen5_#4=\@tempdima
2418 \ifcompound@_%_if_compound
2419 \rlap{\o@math#2{\currstyle@hbox{#3}}\o@math}
2420 \else
2421 \rlap{\currstyle@hbox{#2{#3}}}
2422 \fi
2423 \endgroup
2424 \fontdimen5_#4=\xxheight@
2425 \advance\@tempdima\@tempdimb}}
2426
2427 \def\wide@@@acc#1{%_uses_fontdimens
2428 \ifcase\mathcount@\def\acc@font{\textfont3}\def\xacc@font{\textfont0}
2429 \or\def\acc@font{\scriptfont3}\def\xacc@font{\scriptfont0}
2430 \else\def\acc@font{\scriptscriptfont3}\def\xacc@font{\scriptscriptfont0}
2431 \fi
2432 \edef\xheight@{\the\fontdimen5\acc@font}%
2433 \edef\xxheight@{\the\fontdimen5\xacc@font}%
2434 \@tempdima=\xheight@\@tempdimb=-.55\@tempdima
2435 \acc@def{\H@}{\o@widehat}{#1}\acc@font
2436 \acc@def{\T@}{\o@widetilde}{#1}\acc@font
2437 \xacc@def{\B@}{\widebar}{#1}\xacc@font
2438 \acc@def{\D@}{\o@dot}{#1}\xacc@font

```

```

2439 \acc@def{\DD@}{\o@ddot}{#1}\xacc@font
2440 \acc@def{\BR@}{\o@breve}{#1}\xacc@font
2441 \acc@def{\CH@}{\o@check}{#1}\xacc@font
2442 \the\acc@toks
2443 \currstyle@hbox{#1}
2444 \fontdimen5\acc@font=\xheight@
2445 \fontdimen5\xacc@font=\xxheight@
2446 }
2447
2448 \def\@@@acc#1{%_uses_fontdimens!
2449 \ifcase\mathcount@\def\acc@font{\textfont0 }
2450 \or\def\acc@font{\scriptfont0 }
2451 \else\def\acc@font{\scriptscriptfont0 }
2452 \fi
2453 \edef\xheight@{\the\fontdimen5\acc@font}%
2454 \@tempdima=\xheight@\@tempdimb=-.55\@tempdima
2455 \acc@def{\H@}{\o@hat}{#1}\acc@font
2456 \acc@def{\T@}{\o@tilde}{#1}\acc@font
2457 \acc@def{\B@}{\o@bar}{#1}\acc@font
2458 \acc@def{\D@}{\o@dot}{#1}\acc@font
2459 \acc@def{\DD@}{\o@ddot}{#1}\acc@font
2460 \acc@def{\BR@}{\o@breve}{#1}\acc@font
2461 \acc@def{\CH@}{\o@check}{#1}\acc@font
2462 \the\acc@toks
2463 \currstyle@hbox{#1}
2464 \fontdimen5\acc@font=\xheight@
2465 }
2466
2467 \let\inlineopen@\relax
2468 \let\inlineclose@\relax
2469
2470 %
2471 %_E_x_p_a_n_d_a_b_l_e_h_o_r_i_z_o_n_t_a_l_a_r_r_o_w_s
2472 %
2473
2474 \def\longrightarrow@#1#2{\mathrel{\mathopen-\axis@@
2475 \axis@{#1}{#2}
2476 \axis@@\mathclose\rightarrow}}
2477
2478 \def\longleftarrow@#1#2{\mathrel{\mathopen\leftarrow\axis@@
2479 \axis@{#1}{#2}
2480 \axis@@\mathclose-}}
2481
2482 \def\longleftarrowrightarrow@#1#2{\mathrel{\mathopen\leftarrow\axis@@
2483 \axis@{#1}{#2}
2484 \axis@@\mathclose\rightarrow}}

```

```

2485
2486 \pdef\to{\def\afterparse@{
2487   \longrightarrow@{\ifsp@\sp@toks@\fi}{\ifsb@\sb@toks@\fi}\next}
2488   \sb@false\sp@false
2489   \def\next@comm{\afterassignment\parse@next\let\next=}
2490   \next@comm}
2491
2492 \pdef\ot{\def\afterparse@{
2493   \longleftarrow@{\ifsp@\sp@toks@\fi}{\ifsb@\sb@toks@\fi}\next}
2494   \sb@false\sp@false
2495   \def\next@comm{\afterassignment\parse@next\let\next=}
2496   \next@comm}
2497
2498 \pdef\otto{\def\afterparse@{
2499   \longlefttrightarrow@{\ifsp@\sp@toks@\fi}{\ifsb@\sb@toks@\fi}\next}
2500   \sb@false\sp@false
2501   \def\next@comm{\afterassignment\parse@next\let\next=}
2502   \next@comm}
2503
2504 \pdef\mapsto{\mathrel{\mapstochar}\nobreak\mathclose{}\mathopen{}\to}
2505   \%\nobreak inserted thanks to E.H. Lohse
2506
2507 \def\sp@toks@{\edef\@tempa{\noexpand\noexpand\noexpand\inline{\the\sp@toks}}
2508   \@tempa}
2509
2510 \def\sb@toks@{\edef\@tempa{\noexpand\noexpand\noexpand\inline{\the\sb@toks}}
2511   \@tempa}
2512
2513 \def\axis@#1#2{\setbox0\scriptstylehbox@{\protectinline@true_#1}
2514   \er@wd=\wd0
2515   \setbox\@tempboxa\scriptstylehbox@{\protectinline@true_#2}
2516   \ifdim\wd\@tempboxa>\er@wd \er@wd=\wd\@tempboxa\fi
2517   \@tempdima=\ht\@tempboxa
2518   \advance\@tempdima\dp\@tempboxa
2519   \advance\@tempdima-.42\mex
2520   \vtop{\offinterlineskip
2521     \hbox{\vbox{\hbox to\er@wd{\hss\box0\hss}}%
2522       \vskip-.26\mex
2523       \hbox to\er@wd{\axis@@@ \hfill}}}
2524     \vskip-.26\mex
2525     \hbox to\er@wd{\hss\box\@tempboxa\hss}}
2526   }
2527
2528 \def\axis@@{\mkern-4.5mu\%%\mkern_setting_adjusted_24_Sept._2002
2529   \axis@@@ \mskip 3mu plus \arrow@expandability mu\%%\thanks_to_E.H._Lohse
2530   \mkern-4.5mu}

```

```

2531
2532 \def\axis@@@{%
2533   \cleaders\hbox{\o@math\mkern-3mu\icurrstyle@\mathord-\mkern-3mu\o@math}}
2534
2535 \def\arrow@expandability{1.2}
2536
2537 %
2538 %_o_o_t_s
2539 %
2540 \def\o@sqrt{\radical"270370 }
2541
2542 \pdef\sqrt#1{\inlineopen@\kern.4\mex\root@{#1}\inlineclose@}
2543 % \def_changed_to_ \pdef_on_25_Sept._2002_thanks_to_Michal_Malek
2544
2545 \pdef\root#1#2{\inlineopen@\kern.5\mex\root@{#1}{#2}\inlineclose@}
2546 % \def_changed_to_ \pdef_on_25_Sept._2002_thanks_to_Michal_Malek
2547
2548 \def\root@#1#2{%
2549   \setbox0\currstyle\hbox{\toprestricted@true #2
2550   \vrule\@height 1.6\mex\@depth0pt\@width 0pt}%_mathstrut's_top
2551   \setbox\@tempboxa\hbox{\o@math\currstyle@
2552   \ifdisplay@\@tempdima=.6\dp\sizebox@\@bottom_is_half_of_that_of_sizebox
2553   \else\@tempdima=.2\mex\@bottom_is_a_bit_below_the_baseline
2554   \fi
2555   \setbox\@tempboxa\hbox\to\wd0{%
2556     \vrule\@height\ht0\@depth\@tempdima\@width 0pt\hss}%
2557   \global\setbox\sizebox@\copy\@tempboxa
2558   \setbox\@tempboxa\hbox{\o@math\currstyle@\o@sqrt{\box\@tempboxa}\o@math}%
2559   \@tempdima=\ht\@tempboxa\advance\@tempdima-\dp\@tempboxa
2560   \advance\@tempdima 1.6\mex
2561   \raise.4\@tempdima\hbox{\advance\mathcount@2\imath@{#1}}}%
2562   \kern-.3\mex
2563   \box\@tempboxa
2564   \o@math}%_tempboxa:=the_radical_sign_with_#1_and_without_#2
2565   \resizebox@{\sizebox@}%_sizebox_matches_top_of_#2_and_bottom_at_@tempdima
2566   \setbox0\hbox\to\wd\@tempboxa{\hss\box0}%_box0=#1_shifted_right
2567   \setbox0\vbox{\offinterlineskip
2568     \vskip-.1\mex
2569     \@tempdima=\ht\@tempboxa
2570     \dimen@=\dp\@tempboxa
2571     \advance\@tempdima\dimen@
2572     \advance\@tempdima-.55\mex
2573     \box\@tempboxa
2574     \vskip-\@tempdima
2575     \box0}%_box0=the_result
2576   \box0\kern.3\mex\relax}%_space_following_the_root

```



```

2577 }
2578
2579 %
2580 %\U_n_d_e_r_b_r_a_c_e_and_o_v_e_r_b_r_a_c_e
2581 %
2582
2583 %_Underbrace_and_overbrace_are_designed_as_escape_commands,_because_they
2584 %_may_extend_accross_unbalanced_delimiters:
2585
2586 \def\@underbrace#1{\o@mathop{\vtop{%
2587   \ialign{##\crr
2588     \o@math\hfil\dcrrstyle@{#1}\hfil\o@math\crr
2589     \noalign{\kern_3pt\nointerlineskip}\upbracefill}\crr
2590     \noalign{\kern_3pt}}}\limits}
2591
2592 \def\underbrace#1#2#3{\null\!
2593   \def\@tempa{#2}\def\@tempb{_}%
2594   \ifx\@tempa\@tempb
2595     \b@ubrace@#1\e@ubrace@{#3}\!
2596   \else\n@err{Missing _ after \string\underbrace}
2597     {Wrong syntax. I expected something like \underbrace{...}_{...}}
2598   \fi
2599   \fi}
2600
2601 \def\b@ubrace@{%
2602   \ifdisplay@\store@ec{\b@ubrace@@}{-}
2603   \else\b@ubrace@@
2604   \fi}
2605
2606 \def\b@ubrace@@{\setbox0\hbox\bgroup}
2607
2608 \def\e@ubrace@#1{%
2609   \ifdisplay@\store@ec{\e@ubrace@@{#1}}{-}
2610   \else\e@ubrace@@{#1}
2611   \fi}
2612
2613 \def\e@ubrace@@#1{\egroup\@underbrace{\box0}_{#1}}
2614
2615 \def\@overbrace#1{\o@mathop{\vbox{%
2616   \ialign{##\crr
2617     \noalign{\kern_3pt\nointerlineskip}
2618     \downbracefill}\crr
2619     \noalign{\kern_3pt}\crr
2620     \o@math\hfil\dcrrstyle@{#1}\hfil\o@math\crr}}}\limits}
2621
2622 \def\overbrace#1#2#3{\null\!

```

```

2623 \def\@tempa{#2}\def\@tempb{^}%
2624 \ifx\@tempa\@tempb
2625 \b@obrace@#1\e@obrace@{#3}\!
2626 \else\n@err{Missing ^ after \string\overbrace}
2627 {Wrong syntax. I expected something like \overbrace{...}^{...}}
2628 #1
2629 \fi}
2630
2631 \def\b@obrace@{%
2632 \ifdisplay@\store@ec{\b@obrace@@}{-}
2633 \else\b@obrace@@
2634 \fi}
2635
2636 \def\b@obrace@@{\setbox0\hbox\bgroup}
2637
2638 \def\e@obrace@#1{%
2639 \ifdisplay@\store@ec{\e@obrace@@{#1}}{-}
2640 \else\e@obrace@@{#1}
2641 \fi}
2642
2643 \def\e@obrace@@#1{\egroup\@overbrace{\box0}^{#1}}
2644
2645 %
2646 %_F_r_a_c_t_i_o_n_s
2647 %
2648
2649 %_This_is_tricky.
2650 %_See_Natural_TeX_notation_in_mathematics,
2651 %_in:_Proc._Conf._EuroTeX_2001,_Kerkrade,_23--27_September_2001;
2652 %_online_at_www.ntg.nl/eurotex/proceedings.html
2653
2654 \let\o@over=\over
2655 \let\o@atop=\atop
2656 \let\o@choose=\choose
2657
2658 \def\over{\n@err{Disabled command \string\over}}
2659 {No more a valid command. Replace {A \over B} with \frac A B.}}
2660 \def\atop{\n@err{Disabled command \string\atop}}
2661 {No more a valid command. Use array instead.}}
2662 \def\choose{\n@err{Disabled command \string\choose}}
2663 {No more a valid command. Replace {A \choose B} with \binom A B.}}
2664
2665 %_ \frac_is_defined_here
2666
2667 \pdef\frac#1#2{%
2668 \checknumeric@{#1#2}

```

```

2669 \ifdisplay@
2670 \ifresult@_%.numeric_extensible
2671 \ext@frac{#1}{#2}
2672 \else\d@Frac{#1}{#2}
2673 \fi
2674 \else\inlinefrac@{#1}{#2}
2675 \fi
2676 }
2677
2678 %_displayed_fraction_with_setsize.
2679
2680 \newdimen\htdecrement@_%.global
2681 \newdimen\dpdecrement@_%.global
2682
2683 \def\d@Frac#1#2{\begingroup
2684 \setbox\@tempboxa\hbox{\o@math\dcrrstyle@
2685 \{\setbox0\currstyle@hbox{\vrule\@depth_.7\mex\@width_0pt
2686 \botrestricted@false_#1}%
2687 \@tempdima=\ht0\advance\@tempdima-\ht\sizebox@
2688 \global\htdecrement@=\@tempdima
2689 %\@tempdima=\dp0\advance\@tempdima_.5ex\dp0=\@tempdima
2690 \box0
2691 \above\fracrulethickness@
2692 \setbox0\currstyle@hbox{\vrule\@height_2\mex\@width_0pt
2693 \toprestricted@false_#2}%
2694 \@tempdimb=\dp0\advance\@tempdimb-\dp\sizebox@
2695 \global\dpdecrement@=\@tempdimb
2696 %\@tempdimb=\ht0\advance\@tempdimb_.5ex\ht0=\@tempdimb
2697 \box0
2698 }%
2699 \o@math}%
2700 \setbox0\copy\@tempboxa
2701 \iftoprestricted@\else
2702 \@tempdimb=\ht0\advance\@tempdimb_.4\mex\ht0=\@tempdimb
2703 \fi
2704 \ifbotrestricted@\else
2705 \@tempdimb=\dp0\advance\@tempdimb_.5\mex\dp0=\@tempdimb
2706 \fi
2707 \box0\print
2708 \@tempdima=\ht\@tempboxa\advance\@tempdima-\htdecrement@
2709 \ht\@tempboxa=\@tempdima
2710 \@tempdima=\dp\@tempboxa\advance\@tempdima-\dpdecrement@
2711 \dp\@tempboxa=\@tempdima
2712 \global\setbox\sizebox@\copy\@tempboxa
2713 \endgroup
2714 \resizebox@{\sizebox@}

```

```

2715
2716 \newdimen\fracrulethickness@
2717 \fracrulethickness@=.3pt
2718
2719 \def\shillingsign@{/}
2720
2721 \def\inlinefrac@#1#2{%
2722   \checkcompact@{#1}{\medmuskip=0mu\thickmuskip=0mu\thinmuskip=0mu}%
2723   \ifresult@{\wrapfrac@{#1}}\else{\wrapfrac@{#1}}\fi
2724   \shillingsign@
2725   \checkcompact@{\mathord{#2}}{\medmuskip=0mu\thickmuskip=0mu}%
2726   \ifresult@{\wrapfrac@{#2}}\else{\wrapfrac@{#2}}\fi
2727 }
2728
2729 %_Extensible_fractions_are_middle_delimiters:
2730
2731 \def\ext@frac#1#2{\mathinner{\ddelim@m:{#1}{#2}}\mathinner{}}
2732
2733 %_Here_is_the_command_to_size_a_numeric_fraction:_small_if_sizebox_fits
2734 %_into_some_bounds._The_bounds_themselves_are_bigger_than_smallest_size
2735 %_parentheses.
2736
2737 \def\size@frac#1#2{%
2738   \ifdim\ht\sizebox>2.3\mex{\dcurrstyle@{#1}\o@over#2}}
2739   \else
2740   \ifdim\dp\sizebox>1.4\mex{\dcurrstyle@{#1}\o@over#2}}
2741   \else{\icurrstyle@{#1}\o@over#2}}
2742   \fi
2743   \fi
2744 }
2745
2746 %_Here_is_a_macro_to_recognize_a_numeric_argument._The_criterion_is_that_after
2747 %_removal_of_all_characters_0--9_the_typeset_box_is_of_height_no_greater_than
2748 %_1/2_ex.
2749
2750 \def\checknumeric@#1{\setbox0\hbox{\defaultdelims@
2751   \o@math\removenums@{#1}\o@math}
2752   \ifdim\ht0>.5ex\relax
2753   \global\result@false
2754   \else\global\result@true
2755   \fi}
2756
2757 \def\removenums@#1{\begingroup\def\frac##1##2{X}
2758   \uccode'='|
2759   \uccode'0='.\uccode'1='.\uccode'2='.\uccode'3='.\uccode'4='.
2760   \uccode'5='.\uccode'6='.\uccode'7='.\uccode'8='.\uccode'9='.\uppercase{#1}

```

```

2761 \endgroup}
2762
2763 \def\checkcompact@#1#2{\setbox\@tempboxa\hbox{\o@math
2764 \def\frac##1##2{\mskip\medmuskip}
2765 \lowercase{\remove@ss\replacebindelims@{#1}{\mathord{}}}}\o@math}
2766 \@tempdima=\wd\@tempboxa
2767 \setbox\@tempboxa\hbox{\o@math\def\frac##1##2{\mskip\medmuskip} #2
2768 \remove@compact{\remove@ss\replacebindelims@{#1}{\mathord{}}}}\o@math}
2769 \advance\@tempdima-\wd\@tempboxa
2770 \ifdim\@tempdima>0pt\relax\result@false\else\result@true\fi}
2771
2772 \catcode'\^=13
2773 \catcode'\_ =13
2774
2775 \def\remove@ss{\def^##1{}\def_ ##1{}}
2776
2777 \catcode'\^=12
2778 \catcode'\_ =12
2779
2780
2781 \def\remove@compact#1{\begingroup
2782 \def\shillingsign@{} \def\backslash{}
2783 \def\vert{} \def\Vert{}
2784 \def\uparrow{} \def\Uparrow{}
2785 \def\downarrow{} \def\Downarrow{}
2786 \def\updownarrow{} \def\Updownarrow{}
2787 \removeslashes@{#1}\endgroup}
2788
2789 \def\removeslashes@#1{\lccode'/'=\_ \lccode'|=\_ \lowercase{#1}}
2790
2791 \newdimen\wrapfrac@dim
2792 \newbox\wrapfrac@box
2793
2794 \def\wrapfrac@#1{%
2795 \begingroup
2796 \@wrapfrac\mathopen{ }#1\relax\mathclose{\}\frac\relax\relax\frac
2797 \endgroup
2798 }
2799 %\relax\_after\_#1\_added\_4.4.2001
2800 %\_space\_after\_#1\_added\_7.5.2001
2801
2802 \def\@wrapfrac#1\frac#2#3#4\frac{%
2803 \def\frac@test{#2}\def\@relax{\relax}
2804 \ifx\frac@test\@relax\_#1
2805 \def\next@frac{}
2806 \else

```

```

2807 \@@wrapfrac{#1}{#2}{#3}{#4}
2808 \def\next@frac{\next@frac@#4\frac}
2809 \fi
2810 \next@frac}
2811
2812 \newif\ifwrap@
2813
2814 \def\@@wrapfrac#1#2#3#4{%
2815 \checknumeric@{#2#3}
2816 \ifresult@ #1{#2\o@over#3}\def\next@frac{\@@wrapfrac}
2817 \else\def\next@frac{\@@wrapfrac\mathord{}}
2818 \wrap@false % to be true iff #4 starts with Ord, Op, Open, Inner
2819 \setbox\wrapfrac@box\hbox{\o@math\mathord{}}#4\mathinner{\}\o@math}
2820 \wrapfrac@dim=\wd\wrapfrac@box
2821 \setbox\wrapfrac@box\hbox{\o@math\mathrel{}}#4\mathinner{\}\o@math}
2822 \advance\wrapfrac@dim-\wd\wrapfrac@box
2823 \ifdim\wrapfrac@dim<0pt \wrap@true\fi
2824 \ifwrap@ % relax
2825 \else % now \wrap@false; to be true if #1 ends with Ord, Op, Close, Inner
2826 \setbox\wrapfrac@box\hbox{\o@math\mathinner{}}#1\mathopen{\}\o@math}
2827 \wrapfrac@dim=\wd\wrapfrac@box
2828 \setbox\wrapfrac@box\hbox{\o@math\mathinner{}}#1\mathrel{\}\o@math}
2829 \advance\wrapfrac@dim-\wd\wrapfrac@box
2830 \ifdim\wrapfrac@dim<0pt \wrap@true\fi
2831 \ifwrap@ % now #1 ends with Ord, Op, Close, Inner
2832 % now \wrap@true; check whether #1 ends with +, -, \pm, \mp
2833 \setbox\wrapfrac@box\hbox{\o@math\testing@true \def\pm{=}\def\mp{=}
2834 \uccode'+=\uccode'-=\uppercase{#1}\mathclose{\}\o@math}
2835 \wrapfrac@dim=\wd\wrapfrac@box
2836 \setbox\wrapfrac@box\hbox{\o@math\testing@true \def\pm{=}\def\mp{=}
2837 \uccode'+=\uccode'-=\uppercase{#1}\mathopen{\}\o@math}
2838 \advance\wrapfrac@dim-\wd\wrapfrac@box
2839 \ifdim\wrapfrac@dim<0pt \wrapexception@{#2}
2840 \ifresult@\wrap@true \else\wrap@false \fi
2841 \fi
2842 \ifwrap@ % now Ord, Op, Close, Inner; test whether Inner
2843 \setbox\wrapfrac@box\hbox{\o@math\testing@true\mathinner{}}#1\mathclose{\}
2844 \o@math}
2845 \wrapfrac@dim=\wd\wrapfrac@box
2846 \setbox\wrapfrac@box\hbox{\o@math\testing@true\mathinner{}}#1\mathpunct{\}
2847 \o@math}
2848 \advance\wrapfrac@dim-\wd\wrapfrac@box
2849 \ifdim\wrapfrac@dim<0pt \result@true % #1 ends with Inner
2850 \else % now test whether #1 ends with a digit
2851 \checkwrapexception@{#1}
2852 \fi

```

```

2853 \ifresult@%_if_wrapexception
2854 \wrapexception@{\uccode'.'='+_%_make_numbers_into_Bins
2855 \uccode'0='+\uccode'1='+\uccode'2='+\uccode'3='+\uccode'4='+
2856 \uccode'5='+\uccode'6='+\uccode'7='+\uccode'8='+\uccode'9='+
2857 \uppercase{#2}}
2858 \ifresult@\wrap@true\else\wrap@false.\fi
2859 \else\wrap@true
2860 \fi
2861 \fi
2862 \else%_now_#1_ends_with_Bin,Rel,Open,Punct
2863 \setbox\wrapfrac@box\hbox{\o@math\mathinner{ }#1\mathclose{ }\o@math}
2864 \wrapfrac@dim=\wd\wrapfrac@box
2865 \setbox\wrapfrac@box\hbox{\o@math\mathinner{ }#1\mathrel{ }\o@math}
2866 \advance\wrapfrac@dim-\wd\wrapfrac@box
2867 \ifdim\wrapfrac@dim<0pt%_#1_ends_with_Bin*
2868 \wrapexception@{#2}
2869 \ifresult@\wrap@true\else\wrap@false.\fi
2870 \else\wrap@false
2871 \fi
2872 \fi
2873 \fi
2874 \ifwrap@
2875 #1(\inlinefrac@{#2}{#3})
2876 \else
2877 #1\mathopen{\}\inlinefrac@{#2}{#3}\mathclose{ }
2878 \fi
2879 \fi}
2880
2881 %_Called_when_#1_ends_with_Ord,Op,Close,Inner;_checks_whether
2882 %_it_ends_with_a_digit.
2883
2884 \def\checkwrapexception@#1{%_checks_whether_#1_ends_with_a_digit
2885 \result@false
2886 \setbox\wrapfrac@box\hbox{\o@math\testing@true
2887 \uccode'0='=\uccode'1='=\uccode'2='=\uccode'3='=\uccode'4='=
2888 \uccode'5='=\uccode'6='=\uccode'7='=\uccode'8='=\uccode'9='=
2889 \uppercase{#1}\mathclose{ }\o@math}
2890 \wrapfrac@dim=\wd\wrapfrac@box
2891 \setbox\wrapfrac@box\hbox{\o@math\testing@true
2892 \uccode'0='=\uccode'1='=\uccode'2='=\uccode'3='=\uccode'4='=
2893 \uccode'5='=\uccode'6='=\uccode'7='=\uccode'8='=\uccode'9='=
2894 \uppercase{#1}\mathopen{ }\o@math}
2895 \advance\wrapfrac@dim-\wd\wrapfrac@box
2896 \ifdim\wrapfrac@dim<0pt\result@true\else.\fi}
2897
2898 \def\wrapexception@#1{%_checks_whether_#1_starts_with_Bin

```

```

2899 \result@false
2900 \setbox\wrapfrac@box\hbox{\o@math\mathord{}}#1\mathclose{}\o@math}
2901 \wrapfrac@dim=\wd\wrapfrac@box
2902 \setbox\wrapfrac@box\hbox{\o@math\mathinner{}}#1\mathclose{}\o@math}
2903 \advance\wrapfrac@dim-\wd\wrapfrac@box
2904 \ifdim\wrapfrac@dim=0pt\result@true\fi}
2905
2906 %
2907 %_A_r_g_u_m_e_n_t_p_l_a_c_e_h_o_l_d_e_r
2908 %
2909
2910 \pdef\adot{\checkpunct@\mathclose{}}
2911 \ifpunct@else\mkern 1.8mu\fi
2912 {\cdot}\,\mathopen{}}
2913
2914 %
2915 %_S_p_a_c_e_s
2916 %
2917
2918 %_Firstly,_disable_spacefactor--_this_makes_typesetting_easier.
2919 %_(US_TeXperts_may_wish_to_restore.)
2920
2921 \frenchspacing
2922
2923 %_Secondly,_we_redefine_'_'_to_produce_breakable_space_in_math_mode.
2924 %_To_be_used_after_a_punctuation,_which_itself_adds_a_thinmuskip.
2925
2926 \def\space@{ }
2927 \def\mspace@{\mskip 2.4mu plus 3.6mu minus 1.8mu}
2928
2929 \def\_{\ifmmode\penalty0\mspace@\else\space@\fi}
2930
2931 %_Quads_are_1pc_long:
2932
2933 \def\quad{\null\hskip1pc\relax}
2934 \def\qqquad{\null\hskip2pc\relax}
2935 \def\qqquad{\null\hskip3pc\relax}
2936
2937 %_Nath_also_introduces_a_new_environment_to_set_math_material_tight.
2938
2939 \def\tight{\def\mspaces@{\thinmuskip=2.4mu
2940 \medmuskip=1.2mu
2941 \thickmuskip=4.5mu
2942 \def\mspace@{\mskip 1.5mu}%
2943 \def\quad{\null\hskip.6pc\relax}%
2944 \def\qqquad{\null\hskip1.2pc\relax}%

```



```

2945 \def\qqquad{\null\hskip 1.8pc\relax}%
2946 }}
2947
2948 \def\endtight{\global\@ignoretrue}
2949
2950 %
2951 %\P_u_n_c_t_u_a_t_i_o_n
2952 %
2953
2954 \newif\ifpunct@%_global
2955
2956 \def\punctpenalty{12756}%_Earth's_diameter_in_kilometers_(>_10000)
2957
2958 \def\@comma{\mc@comma\penalty\punctpenalty\relax}
2959 \def\@semicolon{\mc@semicolon\penalty\punctpenalty\relax}
2960
2961 \def\checkpunct@{\ifnum\lastpenalty=\punctpenalty\relax
2962 \global\punct@true\else\global\punct@false\fi}
2963
2964 \let\o@dots\dots
2965
2966 \pdef\dots{%
2967 \ifmmode
2968 \checkpunct@
2969 \ifpunct@\ldots
2970 \global\punct@false
2971 \else\cdots
2972 \fi
2973 \else\o@dots
2974 \fi}
2975
2976 %
2977 %\A_r_r_a_y
2978 %
2979
2980 \let\o@array=\array
2981 \let\o@endarray=\endarray
2982
2983 \newif\iflasthline@
2984 \global\lasthline@false
2985
2986 \pdef\array{\hskip-\arraycolsep
2987 \def\@arstrut{}
2988 \let\hline\arr@hline
2989 \amp@count=0
2990 \setbox0\hbox\bgroup

```

```

2991   \ifdisplay@\else\advance\mathcount@ 1
2992   \n@warning{Array in in-line mode}
2993   \fi
2994   \o@math\o@array}
2995
2996   % \arraycr is \, but must insert a strut at the end of the line
2997
2998
2999
3000   \def\arraystrut{\vrule height 1.9\mex depth .75\mex width 0pt}
3001
3002   \def\@arraycr{\mathclose{}} % no math space
3003   \hbox{\arraystrut}%
3004   \arraycr@@}
3005
3006   \def\arraycr@@{\crrc % nothing if following another \cr or \halign
3007   \def\@amp{\hbox{\vrule height\arrayrowsep width 0pt}}
3008   \@tempcnta=\amp@count
3009   \loop\ifnum\@tempcnta>1
3010     \edef\@amp{\@amp&} % line sep
3011     \advance\@tempcnta-1
3012   \repeat
3013   \@amp
3014   \cr}
3015
3016   \pdef\endarray{% may follow after \hline; corrected 18 March 2003
3017   \iflasthline@\else\hbox{\arraystrut}\fi
3018   \o@endarray % LaTeX's \endarray
3019   \o@math\egroup
3020   \@tempdima=\ht0 \advance\@tempdima -.15ex \ht0=\@tempdima
3021   \@tempdima=\dp0 \advance\@tempdima -.15ex \dp0=\@tempdima
3022   \resizebox@{0}\box0
3023   \hskip-\arraycolsep\relax}
3024   \newcount\hline@num
3025
3026   \pdef\arr@hline{\noalign\bgroup % begin noalign
3027   \hline@num=1 \result@false
3028   \def\hline@@{\afterassignment\hline@ \global\let\hline@@=} %
3029   \hline@@@}
3030
3031   \def\hline@{
3032     \ifx\hline@@\hline \result@false
3033     \advance\hline@num 1\relax
3034     \else \result@true
3035     \ifx\hline@@\end \global\lasthline@true
3036     \else \global\lasthline@false

```

```

3037   \fi
3038 \fi
3039 \ifresult@
3040   \@tempcnta=\hline@num
3041   \loop\ifnum \@tempcnta>.0
3042     \hrule height\arrayrulewidth
3043     \vskip\doublerulesep
3044     \vskip-\arrayrulewidth
3045     \advance\@tempcnta-1
3046   \repeat
3047   \vskip-\doublerulesep
3048   \egroup\endnoalign
3049   \iflasthline@%_if_the_bottom_line
3050   \else\arraycr@@
3051     \mathopen{\hbox{\arraystrut}}
3052   \fi
3053   \def\hline@@@{\hline@@}
3054 \fi
3055 \hline@@@}
3056
3057 \doublerulesep=\arrayrulewidth
3058
3059 %_@arrayclassz_now_uses_display_mode,_and
3060 %_calls_\@addamp_if_\@lastchclass_=4
3061
3062 \def\@arrayclassz{\ifcase\@lastchclass\@acolampacol
3063 \or\@ampacol\or\or\@addamp\or\@acolampacol\or\@firstampfalse\@acol
3064 \fi
3065 \edef\@preamble{\@preamble
3066 \ifcase\@chnum
3067   \hfil\protect\dmathon@\@sharp\protect\dmathoff@\hfil
3068 \or\protect\dmathon@\@sharp\protect\dmathoff@\hfil
3069 \or\hfil\protect\dmathon@\@sharp\protect\dmathoff@
3070 \fi}
3071 }
3072
3073 %_New_\arraycolsep.
3074
3075 \let\arraycolsepdim=\arraycolsep
3076
3077 \def\arraycolsep{\prorated@\arraycolsepdim}
3078
3079 %_New_\arrayrowsepdim
3080
3081 \newdimen\arrayrowsepdim
3082

```

```

3083 \arrayrowsepdim=.4ex
3084 \def\arrayrowsep{\prorated@\arrayrowsepdim}
3085
3086 %_Counting_&'s
3087
3088 \newcount\amp@count
3089
3090 \def\@addamp{%
3091   \if@firstamp\amp@count=1
3092   \@firstampfalse
3093   \else\advance\amp@count by 1
3094   \edef\@preamble{\@preamble &}%
3095   \fi}
3096
3097
3098
3099 %_Cases_is_arrays
3100
3101 \def\cases{\displayon@{\hskip.5ex\array{ll}}
3102 \def\endcases{\endarray\right.\displayoff@}
3103
3104 %
3105 %_M_a_t_r_i_c_e_s
3106 %
3107
3108 \pdef\matrix{\setbox0\hbox\bgroup\o@math
3109   \ifdisplay@\else\advance\mathcount@ 1
3110   \n@warning{Matrix in in-line mode}
3111   \fi
3112   \vcenter\bgroup%\vskip-.00005ex
3113   \let\=\\crr\baselineskip=2.7\mex\lineskip=1.2\mex
3114   \ialign\bgroup
3115   &\hfil\hbox{\dmathon@##\dmathoff@}\hfil\hskip2\mex\crr}
3116
3117 \pdef\endmatrix{\crr\egroup%\vskip-.00005ex
3118 \egroup\o@math\hskip-2\mex\egroup\resizebox@{0}\box0}
3119
3120 %\def\suppressminus{\afterassignment\suppressminus@@\let\next=}
3121 %\def\@@@minus{-}
3122 %\def\suppressminus@@{\if\next\@@@minus\llap{$-$}\let\next\relax\fi\next}
3123
3124 %_Binom_is_a_matrix:
3125
3126 \pdef\binom#1#2{%
3127   \ifdisplay@(\matrix\inline{#1}\inline{#2}\endmatrix)
3128   \else\advance\mathcount@ 1

```

```

3129 \vcenter{\hbox{\o@math\biglp@\o@math}}
3130 \displayed{\matrix\inline{#1}\\ \inline{#2}\endmatrix}
3131 \vcenter{\hbox{\o@math\bigrp@\o@math}}
3132 \fi}
3133
3134 \mathchardef\biglp@="0300
3135 \mathchardef\bigrp@="0301
3136
3137 %
3138 %T_a_b_l_e_o_f_c_o_n_t_e_n_t_s
3139 %
3140
3141 \let\o@addcontentsline\addcontentsline
3142
3143 \def\addcontentsline#1#2#3{%
3144 \begingroup
3145 \def\acl@{#3}%
3146 \the\protect@toks \def\protect{\noexpand}%
3147 \edef\acl@{\acl@}%
3148 \o@addcontentsline{#1}{#2}{\acl@}%
3149 \endgroup
3150 }
3151
3152 %
3153 %A_M_S_-_L_a_T_e_X
3154 %
3155
3156 %Detecting_AmSLaTeX
3157
3158 \ifx\primfrac\undefined
3159 \else \typeout{} \typeout{AmSLaTeX detected.}
3160 \typeout{Do not expect too much from this combination.}
3161 \typeout{Consult Nath Guide if things go bad.}
3162 \gdef\resetMathstrut@{}
3163 \let\over=\@@over \restore \over
3164 \let\above=\@@above \restore \above
3165 \fi
3166
3167 %
3168 %I_n_i_t_i_a_l_i_z_a_t_i_o_n
3169 %
3170
3171 \catcode'\$=13
3172
3173 \geometryfalse
3174 \silentfalse

```

