

The `amssymb` package

American Mathematical Society

Version 3.01, 2013/01/14

1 Introduction

This file defines all the symbols found in the AMS symbol fonts `msam` and `msbm`.

2 The Implementation

First provide package identification.

```
1 \NeedsTeXFormat{LaTeX2e}% LaTeX 2.09 can't be used (nor non-LaTeX)
2 [1994/12/01]% LaTeX date must be December 1994 or later
3 \ProvidesPackage{amssymb}[2013/01/14 v3.01 AMS font symbols]
```

See the `amsfonts` package documentation for a discussion of the obsolescence of the `psamfonts` option.

```
4 \DeclareOption{psamfonts}{\PassOptionsToPackage{psamfonts}{amsfonts}}
```

Process options.

```
5 \ProcessOptions\relax
```

We call the `amsfonts` package to do the font setup that we need.

```
6 \RequirePackage{amsfonts}[1995/01/01]
```

```
7 \@ifpackageloaded{stix}{%
```

```
8   \PackageWarningNoLine{amssymb}{The 'amssymb' package is redundant when
9   you are using the 'stix' package, so I'm not going to load amssymb}
```

```
10   \endinput
```

```
11 }{}
```

We undefine a few symbols that were perhaps defined by the `amsfonts` package (q.v.); otherwise `\DeclareMathSymbol` would issue some error messages. (All these symbol names are `\let` to the first defined; that way, if the underlying code changes, only one change needs to be made here.)

```
12 \let\square\relax \let\rightsquigarrow\square \let\lozenge\square
```

```
13 \let\vartriangleright\square \let\vartriangleleft\square
```

```
14 \let\trianglerighteq\square \let\trianglelefteq\square
```

Change the `\catcode` of the double-quote character to ensure that it is not active (which at one time was a problem when something like `german.sty` was used). This means that `\let` statements must be made global.

```
15 \begingroup \catcode`\="=12
```

Now we define the complete set of standard symbol names for the `msam` and `msbm` fonts. Redefinitions of symbols or commands which can't be defined via `\DeclareMathSymbol` are already done in the `amsfonts` package (for example, `\yen`, `\widehat`).

```
16 \DeclareMathSymbol{\boxdot}      {\mathbin}{AMSa}{"00}
```

```
17 \DeclareMathSymbol{\boxplus}     {\mathbin}{AMSa}{"01}
```

```
18 \DeclareMathSymbol{\boxtimes}    {\mathbin}{AMSa}{"02}
```

```
19 \DeclareMathSymbol{\square}      {\mathord}{AMSa}{"03}
```

```
20 \DeclareMathSymbol{\blacksquare} {\mathord}{AMSa}{"04}
```

```

21 \DeclareMathSymbol{\centerdot}    {\mathbin}{AMSa}{"05}
22 \DeclareMathSymbol{\lozenge}     {\mathord}{AMSa}{"06}
23 \DeclareMathSymbol{\blacklozenge}{\mathord}{AMSa}{"07}
24 \DeclareMathSymbol{\circlearrowright}{\mathrel}{AMSa}{"08}
25 \DeclareMathSymbol{\circlearrowleft}{\mathrel}{AMSa}{"09}
26 %% In amsfonts.sty:
27 %%\DeclareMathSymbol{\rightleftharpoons}{\mathrel}{AMSa}{"0A}
28 \DeclareMathSymbol{\leftrightharpoons}{\mathrel}{AMSa}{"0B}
29 \DeclareMathSymbol{\boxminus}     {\mathbin}{AMSa}{"0C}
30 \DeclareMathSymbol{\Vdash}        {\mathrel}{AMSa}{"0D}
31 \DeclareMathSymbol{\Vvdash}       {\mathrel}{AMSa}{"0E}
32 \DeclareMathSymbol{\vDash}        {\mathrel}{AMSa}{"0F}
33 \DeclareMathSymbol{\twoheadrightarrow}{\mathrel}{AMSa}{"10}
34 \DeclareMathSymbol{\twoheadleftarrow}{\mathrel}{AMSa}{"11}
35 \DeclareMathSymbol{\leftleftarrows}{\mathrel}{AMSa}{"12}
36 \DeclareMathSymbol{\rightrightarrows}{\mathrel}{AMSa}{"13}
37 \DeclareMathSymbol{\upuparrows}{\mathrel}{AMSa}{"14}
38 \DeclareMathSymbol{\downdownarrows}{\mathrel}{AMSa}{"15}
39 \DeclareMathSymbol{\upharpoonright}{\mathrel}{AMSa}{"16}
40 \global\let\restriction\upharpoonright
41 \DeclareMathSymbol{\downharpoonright}{\mathrel}{AMSa}{"17}
42 \DeclareMathSymbol{\upharpoonleft}{\mathrel}{AMSa}{"18}
43 \DeclareMathSymbol{\downharpoonleft}{\mathrel}{AMSa}{"19}
44 \DeclareMathSymbol{\rightarrowtail}{\mathrel}{AMSa}{"1A}
45 \DeclareMathSymbol{\leftarrowtail}{\mathrel}{AMSa}{"1B}
46 \DeclareMathSymbol{\leftrightarrows}{\mathrel}{AMSa}{"1C}
47 \DeclareMathSymbol{\rightleftarrows}{\mathrel}{AMSa}{"1D}
48 \DeclareMathSymbol{\Lsh}          {\mathrel}{AMSa}{"1E}
49 \DeclareMathSymbol{\Rsh}          {\mathrel}{AMSa}{"1F}
50 \DeclareMathSymbol{\rightsquigarrow}{\mathrel}{AMSa}{"20}
51 \DeclareMathSymbol{\leftrightsquigarrow}{\mathrel}{AMSa}{"21}
52 \DeclareMathSymbol{\looparrowleft}{\mathrel}{AMSa}{"22}
53 \DeclareMathSymbol{\looparrowright}{\mathrel}{AMSa}{"23}
54 \DeclareMathSymbol{\circeq}       {\mathrel}{AMSa}{"24}
55 \DeclareMathSymbol{\succsim}      {\mathrel}{AMSa}{"25}
56 \DeclareMathSymbol{\gtrsim}       {\mathrel}{AMSa}{"26}
57 \DeclareMathSymbol{\gtrapprox}    {\mathrel}{AMSa}{"27}
58 \DeclareMathSymbol{\multimap}     {\mathrel}{AMSa}{"28}
59 \DeclareMathSymbol{\therefore}    {\mathrel}{AMSa}{"29}
60 \DeclareMathSymbol{\because}      {\mathrel}{AMSa}{"2A}
61 \DeclareMathSymbol{\doteqdot}     {\mathrel}{AMSa}{"2B}
62 \global\let\Doteq\doteqdot
63 \DeclareMathSymbol{\triangleq}    {\mathrel}{AMSa}{"2C}
64 \DeclareMathSymbol{\precsim}      {\mathrel}{AMSa}{"2D}
65 \DeclareMathSymbol{\lessim}       {\mathrel}{AMSa}{"2E}
66 \DeclareMathSymbol{\lessapprox}   {\mathrel}{AMSa}{"2F}
67 \DeclareMathSymbol{\eqslantless}  {\mathrel}{AMSa}{"30}
68 \DeclareMathSymbol{\eqslantgtr}   {\mathrel}{AMSa}{"31}
69 \DeclareMathSymbol{\curlyeqprec}  {\mathrel}{AMSa}{"32}
70 \DeclareMathSymbol{\curlyeqsucc}  {\mathrel}{AMSa}{"33}
71 \DeclareMathSymbol{\preccurlyeq}  {\mathrel}{AMSa}{"34}
72 \DeclareMathSymbol{\leqq}         {\mathrel}{AMSa}{"35}
73 \DeclareMathSymbol{\leqslant}     {\mathrel}{AMSa}{"36}
74 \DeclareMathSymbol{\lessgtr}      {\mathrel}{AMSa}{"37}
75 \DeclareMathSymbol{\backprime}    {\mathord}{AMSa}{"38}
76 \DeclareMathSymbol{\risingdotseq}{\mathrel}{AMSa}{"3A}
77 \DeclareMathSymbol{\fallingdotseq}{\mathrel}{AMSa}{"3B}
78 \DeclareMathSymbol{\succcurlyeq}  {\mathrel}{AMSa}{"3C}
79 \DeclareMathSymbol{\geqq}         {\mathrel}{AMSa}{"3D}

```

```

80 \DeclareMathSymbol{\geqslant}      {\mathrel}{AMSA}{"3E}
81 \DeclareMathSymbol{\gtrless}      {\mathrel}{AMSA}{"3F}
82 %% in amsfonts.sty
83 %% \DeclareMathSymbol{\sqsubset}    {\mathrel}{AMSA}{"40}
84 %% \DeclareMathSymbol{\sqsupset}    {\mathrel}{AMSA}{"41}
85 \DeclareMathSymbol{\vartriangleright}{\mathrel}{AMSA}{"42}
86 \DeclareMathSymbol{\vartriangleleft}{\mathrel}{AMSA}{"43}
87 \DeclareMathSymbol{\trianglerighteq}{\mathrel}{AMSA}{"44}
88 \DeclareMathSymbol{\trianglelefteq}{\mathrel}{AMSA}{"45}
89 \DeclareMathSymbol{\bigstar}       {\mathord}{AMSA}{"46}
90 \DeclareMathSymbol{\between}       {\mathrel}{AMSA}{"47}
91 \DeclareMathSymbol{\blacktriangledown}{\mathord}{AMSA}{"48}
92 \DeclareMathSymbol{\blacktriangleright}{\mathrel}{AMSA}{"49}
93 \DeclareMathSymbol{\blacktriangleleft}{\mathrel}{AMSA}{"4A}
94 \DeclareMathSymbol{\vartriangle}    {\mathrel}{AMSA}{"4D}
95 \DeclareMathSymbol{\blacktriangle}  {\mathord}{AMSA}{"4E}
96 \DeclareMathSymbol{\triangledown}   {\mathord}{AMSA}{"4F}
97 \DeclareMathSymbol{\eqcirc}        {\mathrel}{AMSA}{"50}
98 \DeclareMathSymbol{\lesseqgtr}     {\mathrel}{AMSA}{"51}
99 \DeclareMathSymbol{\gtreqless}     {\mathrel}{AMSA}{"52}
100 \DeclareMathSymbol{\lesseqqgtr}    {\mathrel}{AMSA}{"53}
101 \DeclareMathSymbol{\gtreqqless}    {\mathrel}{AMSA}{"54}
102 \DeclareMathSymbol{\Rrightarrow}   {\mathrel}{AMSA}{"56}
103 \DeclareMathSymbol{\Lleftarrow}    {\mathrel}{AMSA}{"57}
104 \DeclareMathSymbol{\veebar}        {\mathbin}{AMSA}{"59}
105 \DeclareMathSymbol{\barwedge}      {\mathbin}{AMSA}{"5A}
106 \DeclareMathSymbol{\doublebarwedge}{\mathbin}{AMSA}{"5B}
107 %% In amsfonts.sty
108 %% \DeclareMathSymbol{\angle}       {\mathord}{AMSA}{"5C}
109 \DeclareMathSymbol{\measuredangle}  {\mathord}{AMSA}{"5D}
110 \DeclareMathSymbol{\sphericalangle}{\mathord}{AMSA}{"5E}
111 \DeclareMathSymbol{\varpropto}      {\mathrel}{AMSA}{"5F}
112 \DeclareMathSymbol{\smallsmile}    {\mathrel}{AMSA}{"60}
113 \DeclareMathSymbol{\smallfrown}    {\mathrel}{AMSA}{"61}
114 \DeclareMathSymbol{\Subset}        {\mathrel}{AMSA}{"62}
115 \DeclareMathSymbol{\Supset}        {\mathrel}{AMSA}{"63}
116 \DeclareMathSymbol{\Cup}           {\mathbin}{AMSA}{"64}
117 \global\let\doublecup\Cup
118 \DeclareMathSymbol{\Cap}           {\mathbin}{AMSA}{"65}
119 \global\let\doublecap\Cap
120 \DeclareMathSymbol{\curlywedge}    {\mathbin}{AMSA}{"66}
121 \DeclareMathSymbol{\curlyvee}      {\mathbin}{AMSA}{"67}
122 \DeclareMathSymbol{\leftthreetimes}{\mathbin}{AMSA}{"68}
123 \DeclareMathSymbol{\rightthreetimes}{\mathbin}{AMSA}{"69}
124 \DeclareMathSymbol{\subseteqq}     {\mathrel}{AMSA}{"6A}
125 \DeclareMathSymbol{\supseteqq}     {\mathrel}{AMSA}{"6B}
126 \DeclareMathSymbol{\bumpeq}        {\mathrel}{AMSA}{"6C}
127 \DeclareMathSymbol{\Bumpeq}        {\mathrel}{AMSA}{"6D}
128 \DeclareMathSymbol{\lll}           {\mathrel}{AMSA}{"6E}
129 \global\let\lllless\lll
130 \DeclareMathSymbol{\ggg}           {\mathrel}{AMSA}{"6F}
131 \global\let\gggtr\ggg
132 \DeclareMathSymbol{\circledS}      {\mathord}{AMSA}{"73}
133 \DeclareMathSymbol{\pitchfork}     {\mathrel}{AMSA}{"74}
134 \DeclareMathSymbol{\dotplus}       {\mathbin}{AMSA}{"75}
135 \DeclareMathSymbol{\backsimeq}     {\mathrel}{AMSA}{"76}
136 \DeclareMathSymbol{\backsimeq}     {\mathrel}{AMSA}{"77}
137 \DeclareMathSymbol{\complement}    {\mathord}{AMSA}{"7B}
138 \DeclareMathSymbol{\intercal}      {\mathbin}{AMSA}{"7C}

```

```

139 \DeclareMathSymbol{\circledcirc} {\mathbin}{AMSA}{"7D}
140 \DeclareMathSymbol{\circledast} {\mathbin}{AMSA}{"7E}
141 \DeclareMathSymbol{\circleddash} {\mathbin}{AMSA}{"7F}
142 %% Begin AMSb declarations
143 \DeclareMathSymbol{\lvertneqq} {\mathrel}{AMSb}{"00}
144 \DeclareMathSymbol{\gvertneqq} {\mathrel}{AMSb}{"01}
145 \DeclareMathSymbol{\nleq} {\mathrel}{AMSb}{"02}
146 \DeclareMathSymbol{\ngeq} {\mathrel}{AMSb}{"03}
147 \DeclareMathSymbol{\nless} {\mathrel}{AMSb}{"04}
148 \DeclareMathSymbol{\ngtr} {\mathrel}{AMSb}{"05}
149 \DeclareMathSymbol{\nprec} {\mathrel}{AMSb}{"06}
150 \DeclareMathSymbol{\nsucc} {\mathrel}{AMSb}{"07}
151 \DeclareMathSymbol{\lneqq} {\mathrel}{AMSb}{"08}
152 \DeclareMathSymbol{\gneqq} {\mathrel}{AMSb}{"09}
153 \DeclareMathSymbol{\nleqslant} {\mathrel}{AMSb}{"0A}
154 \DeclareMathSymbol{\ngeqslant} {\mathrel}{AMSb}{"0B}
155 \DeclareMathSymbol{\lneq} {\mathrel}{AMSb}{"0C}
156 \DeclareMathSymbol{\gneq} {\mathrel}{AMSb}{"0D}
157 \DeclareMathSymbol{\npreceq} {\mathrel}{AMSb}{"0E}
158 \DeclareMathSymbol{\nsucceq} {\mathrel}{AMSb}{"0F}
159 \DeclareMathSymbol{\precnsim} {\mathrel}{AMSb}{"10}
160 \DeclareMathSymbol{\succnsim} {\mathrel}{AMSb}{"11}
161 \DeclareMathSymbol{\lnsim} {\mathrel}{AMSb}{"12}
162 \DeclareMathSymbol{\gnsim} {\mathrel}{AMSb}{"13}
163 \DeclareMathSymbol{\nleqq} {\mathrel}{AMSb}{"14}
164 \DeclareMathSymbol{\ngeqq} {\mathrel}{AMSb}{"15}
165 \DeclareMathSymbol{\precneqq} {\mathrel}{AMSb}{"16}
166 \DeclareMathSymbol{\succneqq} {\mathrel}{AMSb}{"17}
167 \DeclareMathSymbol{\precnapprox} {\mathrel}{AMSb}{"18}
168 \DeclareMathSymbol{\succnapprox} {\mathrel}{AMSb}{"19}
169 \DeclareMathSymbol{\lnapprox} {\mathrel}{AMSb}{"1A}
170 \DeclareMathSymbol{\gnapprox} {\mathrel}{AMSb}{"1B}
171 \DeclareMathSymbol{\nsim} {\mathrel}{AMSb}{"1C}
172 \DeclareMathSymbol{\ncong} {\mathrel}{AMSb}{"1D}
173 \DeclareMathSymbol{\diagup} {\mathord}{AMSb}{"1E}
174 \DeclareMathSymbol{\diagdown} {\mathord}{AMSb}{"1F}
175 \DeclareMathSymbol{\varsubsetneq} {\mathrel}{AMSb}{"20}
176 \DeclareMathSymbol{\varsupsetneq} {\mathrel}{AMSb}{"21}
177 \DeclareMathSymbol{\nsubseteqq} {\mathrel}{AMSb}{"22}
178 \DeclareMathSymbol{\nsupseteqq} {\mathrel}{AMSb}{"23}
179 \DeclareMathSymbol{\subseteqq} {\mathrel}{AMSb}{"24}
180 \DeclareMathSymbol{\supseteqq} {\mathrel}{AMSb}{"25}
181 \DeclareMathSymbol{\varsubsetneqq} {\mathrel}{AMSb}{"26}
182 \DeclareMathSymbol{\varsupsetneqq} {\mathrel}{AMSb}{"27}
183 \DeclareMathSymbol{\subsetneq} {\mathrel}{AMSb}{"28}
184 \DeclareMathSymbol{\supsetneq} {\mathrel}{AMSb}{"29}
185 \DeclareMathSymbol{\nsubseteq} {\mathrel}{AMSb}{"2A}
186 \DeclareMathSymbol{\nsupseteq} {\mathrel}{AMSb}{"2B}
187 \DeclareMathSymbol{\nparallel} {\mathrel}{AMSb}{"2C}
188 \DeclareMathSymbol{\nmid} {\mathrel}{AMSb}{"2D}
189 \DeclareMathSymbol{\nshortmid} {\mathrel}{AMSb}{"2E}
190 \DeclareMathSymbol{\nshortparallel} {\mathrel}{AMSb}{"2F}
191 \DeclareMathSymbol{\nvdash} {\mathrel}{AMSb}{"30}
192 \DeclareMathSymbol{\nVdash} {\mathrel}{AMSb}{"31}
193 \DeclareMathSymbol{\nvDash} {\mathrel}{AMSb}{"32}
194 \DeclareMathSymbol{\nVDash} {\mathrel}{AMSb}{"33}
195 \DeclareMathSymbol{\ntrianglerighteq} {\mathrel}{AMSb}{"34}
196 \DeclareMathSymbol{\ntrianglelefteq} {\mathrel}{AMSb}{"35}
197 \DeclareMathSymbol{\ntriangleleft} {\mathrel}{AMSb}{"36}

```

```

198 \DeclareMathSymbol{\ntriangleright} {\mathrel}{AMSb}{"37}
199 \DeclareMathSymbol{\nleftarrow}    {\mathrel}{AMSb}{"38}
200 \DeclareMathSymbol{\nrightarrow}   {\mathrel}{AMSb}{"39}
201 \DeclareMathSymbol{\nLeftarrow}   {\mathrel}{AMSb}{"3A}
202 \DeclareMathSymbol{\nRrightarrow}  {\mathrel}{AMSb}{"3B}
203 \DeclareMathSymbol{\nLeftrightarrow}{\mathrel}{AMSb}{"3C}
204 \DeclareMathSymbol{\nleqtrightharpoon}{\mathrel}{AMSb}{"3D}
205 \DeclareMathSymbol{\divideontimes}{\mathbin}{AMSb}{"3E}
206 \DeclareMathSymbol{\varnothing}   {\mathord}{AMSb}{"3F}
207 \DeclareMathSymbol{\nexists}      {\mathord}{AMSb}{"40}
208 \DeclareMathSymbol{\Finv}         {\mathord}{AMSb}{"60}
209 \DeclareMathSymbol{\Game}         {\mathord}{AMSb}{"61}
210 %% In amsfonts.sty:
211 %%\DeclareMathSymbol{\mho}          {\mathord}{AMSb}{"66}
212 \DeclareMathSymbol{\eth}           {\mathord}{AMSb}{"67}
213 \DeclareMathSymbol{\eqsim}         {\mathrel}{AMSb}{"68}
214 \DeclareMathSymbol{\beth}         {\mathord}{AMSb}{"69}
215 \DeclareMathSymbol{\gimel}        {\mathord}{AMSb}{"6A}
216 \DeclareMathSymbol{\daleth}       {\mathord}{AMSb}{"6B}
217 \DeclareMathSymbol{\lessdot}      {\mathbin}{AMSb}{"6C}
218 \DeclareMathSymbol{\gtrdot}       {\mathbin}{AMSb}{"6D}
219 \DeclareMathSymbol{\ltimes}        {\mathbin}{AMSb}{"6E}
220 \DeclareMathSymbol{\rtimes}        {\mathbin}{AMSb}{"6F}
221 \DeclareMathSymbol{\shortmid}      {\mathrel}{AMSb}{"70}
222 \DeclareMathSymbol{\shortparallel}{\mathrel}{AMSb}{"71}
223 \DeclareMathSymbol{\smallsetminus}{\mathbin}{AMSb}{"72}
224 \DeclareMathSymbol{\thicksim}     {\mathrel}{AMSb}{"73}
225 \DeclareMathSymbol{\thickapprox}  {\mathrel}{AMSb}{"74}
226 \DeclareMathSymbol{\approx}       {\mathrel}{AMSb}{"75}
227 \DeclareMathSymbol{\succapprox}   {\mathrel}{AMSb}{"76}
228 \DeclareMathSymbol{\precapprox}   {\mathrel}{AMSb}{"77}
229 \DeclareMathSymbol{\curvearrowleft}{\mathrel}{AMSb}{"78}
230 \DeclareMathSymbol{\curvearrowright}{\mathrel}{AMSb}{"79}
231 \DeclareMathSymbol{\digamma}       {\mathord}{AMSb}{"7A}
232 \DeclareMathSymbol{\varkappa}      {\mathord}{AMSb}{"7B}
233 \DeclareMathSymbol{\Bbbk}          {\mathord}{AMSb}{"7C}
234 \DeclareMathSymbol{\hslash}        {\mathord}{AMSb}{"7D}
235 %% In amsfonts.sty:
236 %%\DeclareMathSymbol{\hbar}         {\mathord}{AMSb}{"7E}
237 \DeclareMathSymbol{\backepsilon}   {\mathrel}{AMSb}{"7F}

```

Now we close the group so that " will get its old `\catcode` back.

```
238 \endgroup
```

The usual `\endinput` to ensure that random garbage at the end of the file doesn't get copied by `docstrip`.

```
239 \endinput
```

Index

Numbers written in *italic* refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in *roman* refer to the code lines where the entry is used.

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