The St Mary's Road symbol font

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1 Introduction

This is a brief guide to the St Mary's Road symbol font, a new symbol font for TEX and LATEX. It is designed to live with the American Mathematical Society's fonts, contained in `amssymb.sty`.

It provides a number of new symbols, including ones for derivation of functional programming (such as ⅄, ⫛ and ⫚), process algebra (⫴, ⧈ and ⨾), domain theory (⨅), linear logic (⅋ and ⅋), multisets (⦇x⦈, ⩏, and ⩲) and many more. It also fixes some 'features' with previous symbols (⊕ used not to be circular, now you can use ⊕ instead) and adds obvious variants of others (such as ⟙, ⤇ and ⤆). It is all wrapped up in a LATEX 2ε package called `stmaryrd`, which can be used by saying:

```
\usepackage{stmaryrd}
```

This package understands a large number of options:

- `heavycircles` says that all of the circular operators such as `\oplus` and `\otimes` should by default be heavy, and that `\varoplus` and `\varotimes` should refer to the light ones.
- `only` says that only the symbols listed in the option list should be defined. For example:

  ```
  \usepackage[only,mapsfrom,Mapsto,Mapsfrom]{stmaryrd}
  ```

  says that only the symbols '⟙', '⤇' and '⤆' should be defined, which is useful if you use a TEX implementation with limited memory.

2 Symbols

The following operators are defined:

⅄ `\Ydown`	⫛ `\Yleft`	⫚ `\Yright`
⅄ `\Yup`	⦶ `\baro`	⧵ `\bbslash`
⅋ `\binampersand`	⅋ `\bindnasrepma`	⊛ `\boxast`
◫ `\boxbar`	⧈ `\boxbox`	⧅ `\boxbslash`
⧇ `\boxcircle`	⊡ `\boxdot`	☐ `\boxempty`

⧄ \boxslash	⋟ \curlyveedownarrow	⋎ \curlyveeuparrow
⋏ \curlywedgedownarrow	⋌ \curlywedgeuparrow	⧹ \fatbslash
⨟ \fatsemi	⫽ \fatslash	⫴ \interleave
⪦ \leftslice	⨼ \merge	⨵ \minuso
⫛ \moo	⨣ \nplus	⦶ \obar
▯ \oblong	⦸ \obslash	⧁ \ogreaterthan
⧀ \olessthan	⦶ \ovee	⦵ \owedge
⪧ \rightslice	⫽ \sslash	▯ \talloblong
◯ \varbigcirc	⋎ \varcurlyvee	⋏ \varcurlywedge
⊛ \varoast	⦶ \varobar	⦸ \varobslash
⊚ \varocircle	⊙ \varodot	⧁ \varogreaterthan
⧀ \varolessthan	⊖ \varominus	⊕ \varoplus
⊘ \varoslash	⊗ \varotimes	⦶ \varovee
⦵ \varowedge	⨯ \vartimes	

(CAR) Added by Chris Rowley, March 2004:

If the amssymb package has been loaded then the following are also defined: `\oast` and `\ocircle`. The following large operators are defined:

⨦ \bigbox	⋎ \bigcurlyvee	⋏ \bigcurlywedge
⫼ \biginterleave	⨄ \bignplus	⫴ \bigparallel
⨅ \bigsqcap	▽ \bigtriangledown	△ \bigtriangleup

The following relations are defined:

∈ \inplus	∋ \niplus	⋪ \ntriangleleftеqslant
⋫ \ntrianglerighteqslant	⫅ \subsetplus	⫅ \subsetpluseq
⫆ \supsetplus	⫆ \supsetpluseq	◁ \triangleleftеqslant
▷ \trianglerighteqslant		

The following arrows are defined:

⟸\Longmapsfrom	⟹\Longmapsto	⇤\Mapsfrom
⇨\Mapsto	⇽ \leftarrowtriangle	⇆ \leftrightarroweq
⇹\leftrightarrowtriangle	↯ \lightning	⟻\longmapsfrom
↤\mapsfrom	↗ \nnearrow	↖ \nnwarrow
⇾\rightarrowtriangle	⦆ \rrparenthesis	↓ \shortdownarrow
← \shortleftarrow	→ \shortrightarrow	↑ \shortuparrow
↘ \ssearrow	↙ \sswarrow	

The following delimiters are defined:

⧘ \Lbag	⧙ \Rbag	⧘ \lbag
⟦ \llbracket	⌈ \llceil	⌊ \llfloor
⦇ \llparenthesis	⧙ \rbag	⟧ \rrbracket
⌉ \rrceil	⌋ \rrfloor	

Note that `\llbracket` and `\rrbracket` are 'growing' delimiters that can be used with `\left` and `\right`:

$$\llbracket \mathcal{P} \rrbracket \quad \left\llbracket \boxplus \mathcal{P} \right\rrbracket \quad \left\llbracket \bigboxplus_{i \in I}^{a \oplus b} P_i \right\rrbracket \quad \left\llbracket \begin{array}{c} a \\ b \\ c \end{array} \right\rrbracket \quad \left\llbracket \begin{array}{c} a \\ b \\ c \\ d \\ e \\ f \end{array} \right\rrbracket$$

The following special characters are used in building others:

/\Arrownot	\Mapsfromchar	\Mapstochar
/\arrownot	\mapsfromchar	

For example, if you type `$\Arrownot\Rightarrow$` you get $\not\Rightarrow$, and if you type `$\arrownot\rightarrowtriangle$` you get $\not\rightarrowtriangle$.

Acknowledgements

Thanks to David Murphy for suggestions in the design of the St Mary's Road font. Thanks to Martin Ward for the first pass of converting the `stmaryrd` package to LaTeX 2$_\varepsilon$. Thanks to Simon Mercer for all the wine at 45 St. Mary's Road.

Legal rubbish

3 Installation

To begin with, the `stmaryrd` package is installed by running LaTeX 2$_\varepsilon$ on this document, so we begin with the instllation procedure. This needs to use LaTeX 2$_\varepsilon$:

```
⟨*install⟩
\NeedsTeXFormat{LaTeX2e}
```

First of all, we write out a little `.ins` file which creates the `stmaryrd` package:

```
\begin{filecontents}{stmaryrd.ins}
   \generateFile{stmaryrd.sty}{f}{
      \from{stmaryrd.dtx}{package}}
   \generateFile{Ustmry.fd}{f}{
      \from{stmaryrd.dtx}{fontdef}}
\end{filecontents}
```

Then we do some horrible low-level hacks to run docstrip on `stmaryrd.ins`:

```
\bgroup
   \makeatletter
   \let\@@end=\relax
   \def\batchfile{stmaryrd.ins}
   \input{docstrip}
\egroup
```

That's it for the installation:

```
⟨/install⟩
```

4 Documentation

We now provide the documentation driver for this document:

```
⟨*driver⟩
\documentclass{ltxdoc}
\DisableCrossrefs
\OnlyDescription
\usepackage{stmaryrd}
```

`\symbols` `\endsymbols` `\dosymbol` `\test` Some hacks that are used in the documentation:

```
\def\symbols{\flushleft}
\def\endsymbols{\endflushleft}
\def\dosymbol#1{\leavevmode\hbox to .33\textwidth{\hbox to 1.2em
    {\hss$#1$\hfil}\footnotesize\tt\string#1\hss}\penalty10}
\def\test#1{\par\leavevmode\llap{#1\tt\string#1:}
   \rlap{#1$\left\llbracket\bigbox_{i \inplus I}^{a \varoplus b} P_i
   \right\rrbracket$}}
```

Then we produce the documentation:

```
\begin{document}
   \DocInput{stmaryrd.dtx}
\end{document}
⟨/driver⟩
```

5 The package

We can now implement the `stmaryrd` package.

```
⟨*package⟩
\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{stmaryrd}[1994/03/03 St Mary's Road symbol package]
```

`\stmry@if` Most definitions in this file are preceded by `stm@if`, which sets its second argument to be undefined, and expands to `\iftrue` if its second argument is going to be defined, for example:

```
\stmry@if\def\foo{baz}\fi
```

By default, this is always true.

```
\def\stmry@if#1#2{\let#2=\@undefined\iftrue#1#2}
```

`\ds@only` `\stmry@only` The `only` option causes `\stmry@if` to be true only when its second argument is defined to be `\relax`.

```
\DeclareOption{only}{\let\stmry@if=\stmry@only}
\def\stmry@only#1#2{\ifx#2\relax\let#2=\@undefined#1#2}
```

`\ds@heavycircles` `\ifstmry@heavy@` The `heavycircles` option makes sure all of the heavy circles are defined, and sets `\stmry@heavy@true`.

```
\newif\ifstmry@heavy@
\stmry@heavy@false
\DeclareOption{heavycircles}{%
   \stmry@option{varotimes}\stmry@option{varoast}%
```

```
    \stmry@option{varobar}\stmry@option{varodot}%
    \stmry@option{varoslash}\stmry@option{varobslash}%
    \stmry@option{varocircle}\stmry@option{varoplus}%
    \stmry@option{varominus}\stmry@option{varbigcirc}%
    \stmry@heavy@true
}
```

`\stmry@option` For every other option, we call `\stmry@option`, which defines its argument to be `\relax`.

```
\def\stmry@option#1{\expandafter\let\csname#1\endcsname\relax}
\DeclareOption*{\stmry@option\CurrentOption}
```

`\ds@Mapsto` `\ds@mapsfrom` `\ds@Mapsfrom` `\ds@longarrownot` `\ds@Longarrownot` `\ds@longmapsto` `\ds@Longmapsto` `\ds@longmapsfrom` `\ds@Longmapsfrom` All of the other options for `stmaryrd` are command names. Some of the commands need others to be defined, so we declare these explicitly.

```
\DeclareOption{Mapsto}{%
    \stmry@option{Mapsto}%
    \stmry@option{Mapstochar}%
}
\DeclareOption{mapsfrom}{%
    \stmry@option{mapsfrom}%
    \stmry@option{mapsfromchar}%
}
\DeclareOption{Mapsfrom}{%
    \stmry@option{Mapsfrom}%
    \stmry@option{Mapsfromchar}%
}
\DeclareOption{longarrownot}{%
    \stmry@option{longarrownot}%
    \stmry@option{arrownot}%
}
\DeclareOption{Longarrownot}{%
    \stmry@option{Longarrownot}%
    \stmry@option{Arrownot}%
}
\DeclareOption{Longmapsto}{%
    \stmry@option{Longmapsto}%
    \stmry@option{Mapstochar}%
}
\DeclareOption{longmapsfrom}{%
    \stmry@option{longmapsfrom}%
    \stmry@option{mapsfromchar}%
}
\DeclareOption{Longmapsfrom}{%
    \stmry@option{Longmapsfrom}%
    \stmry@option{Mapsfromchar}%
}
```

Then we can process the options!

```
\ProcessOptions
```

Declare the symbol fonts:

```
\DeclareSymbolFont{stmry}{U}{stmry}{m}{n}
\SetSymbolFont{stmry}{bold}{U}{stmry}{b}{n}
```

Then we load those symbols!

```
\stmry@if\DeclareMathSymbol\shortleftarrow\mathrel{stmry}{"00}\fi
\stmry@if\DeclareMathSymbol\shortrightarrow\mathrel{stmry}{"01}\fi
\stmry@if\DeclareMathSymbol\shortuparrow\mathrel{stmry}{"02}\fi
\stmry@if\DeclareMathSymbol\shortdownarrow\mathrel{stmry}{"03}\fi
\stmry@if\DeclareMathSymbol\Yup\mathbin{stmry}{"04}\fi
\stmry@if\DeclareMathSymbol\Ydown\mathbin{stmry}{"05}\fi
\stmry@if\DeclareMathSymbol\Yleft\mathbin{stmry}{"06}\fi
\stmry@if\DeclareMathSymbol\Yright\mathbin{stmry}{"07}\fi
\stmry@if\DeclareMathSymbol\varcurlyvee\mathbin{stmry}{"08}\fi
\stmry@if\DeclareMathSymbol\varcurlywedge\mathbin{stmry}{"09}\fi
\stmry@if\DeclareMathSymbol\minuso\mathbin{stmry}{"0A}\fi
\stmry@if\DeclareMathSymbol\baro\mathbin{stmry}{"0B}\fi
\stmry@if\DeclareMathSymbol\sslash\mathbin{stmry}{"0C}\fi
\stmry@if\DeclareMathSymbol\bbslash\mathbin{stmry}{"0D}\fi
\stmry@if\DeclareMathSymbol\moo\mathbin{stmry}{"0E}\fi
\stmry@if\DeclareMathSymbol\varotimes\mathbin{stmry}{"0F}\fi
\stmry@if\DeclareMathSymbol\varoast\mathbin{stmry}{"10}\fi
\stmry@if\DeclareMathSymbol\varobar\mathbin{stmry}{"11}\fi
\stmry@if\DeclareMathSymbol\varodot\mathbin{stmry}{"12}\fi
\stmry@if\DeclareMathSymbol\varoslash\mathbin{stmry}{"13}\fi
\stmry@if\DeclareMathSymbol\varobslash\mathbin{stmry}{"14}\fi
\stmry@if\DeclareMathSymbol\varocircle\mathbin{stmry}{"15}\fi
\stmry@if\DeclareMathSymbol\varoplus\mathbin{stmry}{"16}\fi
\stmry@if\DeclareMathSymbol\varominus\mathbin{stmry}{"17}\fi
\stmry@if\DeclareMathSymbol\boxast\mathbin{stmry}{"18}\fi
\stmry@if\DeclareMathSymbol\boxbar\mathbin{stmry}{"19}\fi
\stmry@if\DeclareMathSymbol\boxdot\mathbin{stmry}{"1A}\fi
\stmry@if\DeclareMathSymbol\boxslash\mathbin{stmry}{"1B}\fi
\stmry@if\DeclareMathSymbol\boxbslash\mathbin{stmry}{"1C}\fi
\stmry@if\DeclareMathSymbol\boxcircle\mathbin{stmry}{"1D}\fi
\stmry@if\DeclareMathSymbol\boxbox\mathbin{stmry}{"1E}\fi
\stmry@if\DeclareMathSymbol\boxempty\mathbin{stmry}{"1F}\fi
\stmry@if\DeclareMathSymbol\lightning\mathord{stmry}{"20}\fi
\stmry@if\DeclareMathSymbol\merge\mathbin{stmry}{"21}\fi
\stmry@if\DeclareMathSymbol\vartimes\mathbin{stmry}{"22}\fi
\stmry@if\DeclareMathSymbol\fatsemi\mathbin{stmry}{"23}\fi
\stmry@if\DeclareMathSymbol\sswarrow\mathrel{stmry}{"24}\fi
\stmry@if\DeclareMathSymbol\ssearrow\mathrel{stmry}{"25}\fi
\stmry@if\DeclareMathSymbol\curlywedgeuparrow\mathrel{stmry}{"26}\fi
\stmry@if\DeclareMathSymbol\curlywedgedownarrow\mathrel{stmry}{"27}\fi
\stmry@if\DeclareMathSymbol\fatslash\mathbin{stmry}{"28}\fi
\stmry@if\DeclareMathSymbol\fatbslash\mathbin{stmry}{"29}\fi
\stmry@if\DeclareMathSymbol\lbag\mathbin{stmry}{"2A}\fi
\stmry@if\DeclareMathSymbol\rbag\mathbin{stmry}{"2B}\fi
\stmry@if\DeclareMathSymbol\varbigcirc\mathbin{stmry}{"2C}\fi
\stmry@if\DeclareMathSymbol\leftrightarroweq\mathrel{stmry}{"2D}\fi
\stmry@if\DeclareMathSymbol\curlyveedownarrow\mathrel{stmry}{"2E}\fi
\stmry@if\DeclareMathSymbol\curlyveeuparrow\mathrel{stmry}{"2F}\fi
\stmry@if\DeclareMathSymbol\nnwarrow\mathrel{stmry}{"30}\fi
\stmry@if\DeclareMathSymbol\nnearrow\mathrel{stmry}{"31}\fi
\stmry@if\DeclareMathSymbol\leftslice\mathbin{stmry}{"32}\fi
\stmry@if\DeclareMathSymbol\rightslice\mathbin{stmry}{"33}\fi
\stmry@if\DeclareMathSymbol\varolessthan\mathbin{stmry}{"34}\fi
```

```
\stmry@if\DeclareMathSymbol\varogreaterthan\mathbin{stmry}{"35}\fi
\stmry@if\DeclareMathSymbol\varovee\mathbin{stmry}{"36}\fi
\stmry@if\DeclareMathSymbol\varowedge\mathbin{stmry}{"37}\fi
\stmry@if\DeclareMathSymbol\talloblong\mathbin{stmry}{"38}\fi
\stmry@if\DeclareMathSymbol\interleave\mathbin{stmry}{"39}\fi
%% (CAR) Added by Chris Rowley, March 2004:
\stmry@if\let\oast\circledast\fi
\stmry@if\let\ocircle\circledcirc\fi
%%
\stmry@if\DeclareMathSymbol\obar\mathbin{stmry}{"3A}\fi
\stmry@if\DeclareMathSymbol\obslash\mathbin{stmry}{"3B}\fi
\stmry@if\DeclareMathSymbol\olessthan\mathbin{stmry}{"3C}\fi
\stmry@if\DeclareMathSymbol\ogreaterthan\mathbin{stmry}{"3D}\fi
\stmry@if\DeclareMathSymbol\ovee\mathbin{stmry}{"3E}\fi
\stmry@if\DeclareMathSymbol\owedge\mathbin{stmry}{"3F}\fi
\stmry@if\DeclareMathSymbol\oblong\mathbin{stmry}{"40}\fi
\stmry@if\DeclareMathSymbol\inplus\mathrel{stmry}{"41}\fi
\stmry@if\DeclareMathSymbol\niplus\mathrel{stmry}{"42}\fi
\stmry@if\DeclareMathSymbol\nplus\mathbin{stmry}{"43}\fi
\stmry@if\DeclareMathSymbol\subsetplus\mathrel{stmry}{"44}\fi
\stmry@if\DeclareMathSymbol\supsetplus\mathrel{stmry}{"45}\fi
\stmry@if\DeclareMathSymbol\subsetpluseq\mathrel{stmry}{"46}\fi
\stmry@if\DeclareMathSymbol\supsetpluseq\mathrel{stmry}{"47}\fi
\stmry@if\DeclareMathSymbol\Lbag\mathopen{stmry}{"48}\fi
\stmry@if\DeclareMathSymbol\Rbag\mathclose{stmry}{"49}\fi

\stmry@if\DeclareMathSymbol\llparenthesis\mathopen{stmry}{"4C}\fi
\stmry@if\DeclareMathSymbol\rrparenthesis\mathclose{stmry}{"4D}\fi
\stmry@if\DeclareMathSymbol\binampersand\mathopen{stmry}{"4E}\fi
\stmry@if\DeclareMathSymbol\bindnasrepma\mathclose{stmry}{"4F}\fi
\stmry@if\DeclareMathSymbol\trianglelefteqslant\mathrel{stmry}{"50}\fi
\stmry@if\DeclareMathSymbol\trianglerighteqslant\mathrel{stmry}{"51}\fi
\stmry@if\DeclareMathSymbol\ntrianglelefteqslant\mathrel{stmry}{"52}\fi
\stmry@if\DeclareMathSymbol\ntrianglerighteqslant\mathrel{stmry}{"53}\fi
\stmry@if\DeclareMathSymbol\llfloor\mathopen{stmry}{"54}\fi
\stmry@if\DeclareMathSymbol\rrfloor\mathclose{stmry}{"55}\fi
\stmry@if\DeclareMathSymbol\llceil\mathopen{stmry}{"56}\fi
\stmry@if\DeclareMathSymbol\rrceil\mathclose{stmry}{"57}\fi
\stmry@if\DeclareMathSymbol\arrownot\mathrel{stmry}{"58}\fi
\stmry@if\DeclareMathSymbol\Arrownot\mathrel{stmry}{"59}\fi
\stmry@if\DeclareMathSymbol\Mapstochar\mathrel{stmry}{"5A}\fi
\stmry@if\DeclareMathSymbol\mapsfromchar\mathrel{stmry}{"5B}\fi
\stmry@if\DeclareMathSymbol\Mapsfromchar\mathrel{stmry}{"5C}\fi
%% (CAR) Corrected by Chris Rowley, March 2004:
%% \stmry@if\DeclareMathSymbol\leftrightarrowtriangle\mathbin{stmry}{"5D}\fi
\stmry@if\DeclareMathSymbol\leftrightarrowtriangle\mathrel{stmry}{"5D}\fi
%%
\stmry@if\DeclareMathSymbol\leftarrowtriangle\mathrel{stmry}{"5E}\fi
\stmry@if\DeclareMathSymbol\rightarrowtriangle\mathrel{stmry}{"5F}\fi
\stmry@if\DeclareMathSymbol\bigtriangledown\mathop{stmry}{"60}\fi
\stmry@if\DeclareMathSymbol\bigtriangleup\mathop{stmry}{"61}\fi
\stmry@if\DeclareMathSymbol\bigcurlyvee\mathop{stmry}{"62}\fi
\stmry@if\DeclareMathSymbol\bigcurlywedge\mathop{stmry}{"63}\fi
\stmry@if\DeclareMathSymbol\bigsqcap\mathop{stmry}{"64}\fi
```

```
\stmry@if\DeclareMathSymbol\bigbox\mathop{stmry}{"65}\fi
\stmry@if\DeclareMathSymbol\bigparallel\mathop{stmry}{"66}\fi
\stmry@if\DeclareMathSymbol\biginterleave\mathop{stmry}{"67}\fi
\stmry@if\DeclareMathSymbol\bignplus\mathop{stmry}{"70}\fi

\stmry@if\DeclareMathDelimiter\llbracket{\mathopen}{stmry}{"4A}
                                          {stmry}{"71}\fi
\stmry@if\DeclareMathDelimiter\rrbracket{\mathclose}{stmry}{"4B}
                                           {stmry}{"79}\fi
```

The heavy ©:

```
\stmry@if\def\varcopyright
   {{\ooalign{\hfil\raise.07ex\hbox{c}\hfil\crcr%
     \mbox{$\m@th\varbigcirc$}}}}\fi
```

The long arrow negations.

```
\stmry@if\def\longarrownot{\mathrel{\mkern5.5mu\arrownot\mkern-5.5mu}}\fi
\stmry@if\def\Longarrownot{\mathrel{\mkern5.5mu\Arrownot\mkern-5.5mu}}\fi
```

The variants on $\mapsto$:

```
\stmry@if\def\Mapsto{\Mapstochar\Rightarrow}\fi
\stmry@if\def\mapsfrom{\leftarrow\mapsfromchar}\fi
\stmry@if\def\Mapsfrom{\Leftarrow\Mapsfromchar}\fi
\stmry@if\def\Longmapsto{\Mapstochar\Longrightarrow}\fi
\stmry@if\def\longmapsfrom{\longleftarrow\mapsfromchar}\fi
\stmry@if\def\Longmapsfrom{\Longleftarrow\Mapsfromchar}\fi
```

The circular circles:

```
\ifstmry@heavy@
   \def\@swap#1#2{\let\@tempa#1\let#1#2\let#2\@tempa}
   \@swap\varotimes\otimes
   \@swap\varolessthan\olessthan
   \@swap\varogreaterthan\ogreaterthan
   \@swap\varovee\ovee
   \@swap\varowedge\owedge
   \@swap\varoast\oast
   \@swap\varobar\obar
   \@swap\varodot\odot
   \@swap\varoslash\oslash
   \@swap\varobslash\obslash
   \@swap\varocircle\ocircle
   \@swap\varoplus\oplus
   \@swap\varominus\ominus
   \@swap\varbigcirc\bigcirc
   \@swap\varcopyright\copyright
\fi
⟨/package⟩
```

6 The font definitions

The font definitions for the St Mary's Road fonts are:

```
⟨*fontdef⟩
\DeclareFontFamily{U}{stmry}{}
\DeclareFontShape{U}{stmry}{m}{n}
```

```
234    {  <5> <6> <7> <8> <9> <10> gen * stmary
235       <10.95><12><14.4><17.28><20.74><24.88>stmary10%
236    }{}
237 ⟨/fontdef⟩
```