AMS stress test document

Emma Cliffe

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Using this document

This is the AMS LaTeX test document compiled from LaTeX into multiple formats:

- Standard print PDF
- Clearer print PDF
- Accessible web format
- Accessible Word document

The primary purpose of this document is to test parts of AMS LaTeX with some additional packages under various transforms. The content of this document is **not** a description of a transformable set of LaTeX which will certainly be smaller.

1 Standard fonts and symbols

A baseline of text which is a single line long in 12pt font with no indent applied.

Centered text.

Flush left text.

Flush right text.

A baseline of text which is a single line long in 12pt font with no indent applied.

Standard text. Tiny text. Scriptsize text. Footnotesize text. Small text. Normalsize text. large text. Large text. LARGE text. huge text. Huge text.

Standard text. *Emphasized text.* Roman text. Roman inline. SMALL CAPS TEXT. SMALL CAPS INLINE `Typewriter text.` `Typewriter inline.` *Italics text. Italics inline.* Sans serif text. San serif inline. *Slant text. Slant inline.* **Bold text. Bold inline. A combination of bold and *italic text.* A combination inline of bold** *and inline italics***.**

2 Taken from the comprehensive symbol list

Special characters: $ % _ } & # {
Textmode characters:
<~ªº\¶|·{¿}“•”‟†’‡®$§…£—™–¸¡>
Mathmode and textmode: ‡¶…§†£
Accents: ä á ȧ ā â à a a̲ ą ạ ő å a͡ ă ǎ ⓐ ıjï

For mathematical symbols, see the section 4.1.

3 Standard structures

A baseline of text which is a single line long in 12pt font with no indent applied.

> "In the quote environment [paragraphs] are indicated with more vertical spacing between them.
>
> Additional vertical spacing is inserted above and below the displayed text to separate it visually from the the normal text."

A baseline of text to show the height change in the above and below environments. This line was indented though to show off the next environment. The quotations is from "A Guide to LaTeX" [1].

> In the quotation environment, paragraphs are marked by extra indentation of the first line.
>
> The quotation environment is only really meaningful when the regular text makes use of first-line indentation to show off new paragraphs.

A baseline of text which is a single line long in 12pt font with no indent applied.

- An itemized list,
- using standard itemize.
  - With a level 2 sub-point.
    - With a level 3 sub-point.
      - With a level 4 sub-point.
    - Punctuation is important for screenreaders and text to speech.

& Or I can control the marker manually

A baseline of text which is a single line long in 12pt font with no indent applied.
Same list with redefinition using renewcommand of the labels labelitem(i-iv)

* An itemized list
* Using standard itemize

** With a level 2 sub-point

*** With a level 3 sub-point

**** With a level 4 sub-point

& Or I can control the marker manually

- Because the renewcommands were contained in the environment they are not global

A baseline of text which is a single line long in 12pt font with no indent applied.

1. An enumerated list,
2. using standard enumerate.

(a) With a level 2 sub-point.

i. With a level 3 sub-point.

A. With a level 4 sub-point.

ii. Punctuation is important for screenreaders and text to speech.

& Or I can control the marker

A baseline of text which is a single line long in 12pt font with no indent applied.

Same list with redefinition using renewcommand of the labels labelenum(i-iv) by application of arabic, roman, Roman, alph or Alph

I. An enumerated list

II. Using standard enumerate

i. With a level 2 sub-point

A. With a level 3 sub-point

a. With a level 4 sub-point

& Or I can control the marker

1. Because the renewcommands were contained in the environment they are not global

A baseline of text which is a single line long in 12pt font with no indent applied.

first. The marker is a description,

second. in the description environment.

third. It is optional but unhelpful to screenreaders to not include it.

A baseline of text which is a single line long in 12pt font with no indent applied.

Theorem 3.1 (Title of the theorem)**.** *This is a theorem that has been produced WITH the AMS theorem environment and package.*

A baseline of text which is a single line long in 12pt font with no indent applied.

There is the tabbing environment which lines
this with tabbing above and
this with and
and this with tabbing again
until I backwards tab

A baseline of text which is a single line long in 12pt font with no indent applied.

This text is framed in a box. The width is determined by the text.

This box is 0.5 textwidth wide

A baseline of text which is a single line long in 12pt font with no indent applied.

a	b	c	d	insert	abcde
abcd					abcde
$\frac{a}{e}$	$\frac{b}{e}$	$\frac{c}{e}$	$\frac{d}{e}$	insert	$\alpha\beta\gamma\delta\epsilon$

Table 1: This is a table

This is a parbox half the textwidth of the page.
This is the second paragraph in the box.

This is a parbox half the textwidth of the page.
This is the second paragraph in the box.

This is a minipage half the textwidth of the page.
This is the second paragraph in the minipage.

A second minipage is over here...

This is just below where the floating table 1 was defined. It should appear at the top of either this page or the page after this.

First	**Second**	**Third**
This is the first line		
This is the second line	1×2	
This is the third line	$1 \times 2 \times 3$	6
This is the fourth line	$1 \times 2 \times 3 \times 4$	24
This is the fifth line	$1 \times 2 \times 3 \times 4 \times 5$	120
This is the sixth line	$1 \times 2 \times 3 \times 4 \times 5 \times 6$	720
This is the seventh line	$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7$	5040
This is the eighth line	$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$	40320
	The	End

```
This text should be printed verbatim with a linebreak here
  then two spaces at the start of this line which breaks here
> this line has a prompt at the start and now some braces {}
```

This is also `verbatim`[1].

A piece `of verbatim text that we are using to test line breaking`.

A baseline of text which is a single line long in 12pt font with no indent applied. Note in the margin.

A baseline of text which is a single line long in 12pt font with no indent applied.

[1]The word verbatim used inline verbatim.

4 Standard and AMS mathematics symbols

4.1 Standard mathematical symbols and AMS boldsymbol versions

We will use the robust single dollar environment for these
Math versions of text symbols: \$_‡{...}†£©
Math versions of text symbols which disappear in Word: ¶ §
Math versions of text symbols with boldsymbol: $\boldsymbol{\$\_‡\{...\}†£©}$
Math versions of text symbols with boldsymbol which disappear in Word: $\boldsymbol{¶§}$
Keyboard symbols: +− =< / :!′|[]() >
Keyboard symbols allowed with boldsymbol:$\boldsymbol{+- =< / :!'|[]() >}$
But for longer tests we will use the equation environment so that we don't overrun the line if we increase the font size.
Greek:

$$\alpha \cdot \beta \cdot \gamma \cdot \delta \cdot \epsilon \cdot \varepsilon \cdot \zeta \cdot \eta \cdot \theta \cdot \vartheta \cdot \iota \cdot \kappa \cdot \lambda \cdot \mu \cdot \nu \cdot \xi \cdot o \cdot \pi \cdot \varpi \cdot \rho \cdot \varrho \cdot \sigma \cdot \varsigma \cdot \tau \cdot \upsilon \cdot \phi \cdot \varphi \cdot \chi \cdot \psi \cdot \omega \quad (1)$$

Greek with boldsymbol:

$$\boldsymbol{\alpha\beta\gamma\delta\epsilon\varepsilon\zeta\eta\theta\vartheta\iota\kappa\lambda\mu\nu\xi o\pi\varpi\rho\varrho\sigma\varsigma\tau\upsilon\phi\varphi\chi\psi\omega} \quad (2)$$

Upper case Greek:

$$\Gamma \cdot \Delta \cdot \Theta \cdot \Lambda \cdot \Xi \cdot \Pi \cdot \Sigma \cdot \Upsilon \cdot \Phi \cdot \Psi \cdot \Omega \quad (3)$$

Upper case Greek with boldsymbol:

$$\boldsymbol{\Gamma\Delta\Theta\Lambda\Xi\Pi\Sigma\Upsilon\Phi\Psi\Omega} \quad (4)$$

Normal, lower case:

$$a \cdot b \cdot c \cdot d \cdot e \cdot f \cdot g \cdot h \cdot i \cdot j \cdot k \cdot l \cdot m \cdot n \cdot o \cdot p \cdot q \cdot r \cdot s \cdot t \cdot u \cdot v \cdot w \cdot x \cdot y \cdot z \quad (5)$$

Normal, lower case with boldsymbol:

$$\boldsymbol{abcdefghijklmnopqrstuvwxyz} \quad (6)$$

Normal, upper case:

$$A \cdot B \cdot C \cdot D \cdot E \cdot F \cdot G \cdot H \cdot I \cdot J \cdot K \cdot L \cdot M \cdot N \cdot O \cdot P \cdot Q \cdot R \cdot S \cdot T \cdot U \cdot V \cdot W \cdot X \cdot Y \cdot Z \cdot \quad (7)$$

Normal, upper case with boldsymbol:

$$\boldsymbol{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \quad (8)$$

Bold using boldmath, lower case:

$$\boldsymbol{abcdefghijklmnopqrstuvwxyz} \quad (9)$$

Bold using boldmath, upper case:

$$\boldsymbol{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \quad (10)$$

Italic, lower case:

$$a\ b\ c\ d\ e\ f\ g\ h\ i\ j\ k\ l\ m\ n\ o\ p\ q\ r\ s\ t\ u\ v\ w\ x\ y\ z \tag{11}$$

Italic, upper case:

$$A\ B\ C\ D\ E\ F\ G\ H\ I\ J\ K\ L\ M\ N\ O\ P\ Q\ R\ S\ T\ U\ V\ W\ X\ Y\ Z \tag{12}$$

Roman, lower case:

$$\mathrm{abcdefghijklmnopqrstuvwxyz} \tag{13}$$

Roman, lower case with boldsymbol:

$$\mathbf{abcdefghijklmnopqrstuvwxyz} \tag{14}$$

Roman, upper case:

$$\mathrm{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \tag{15}$$

Roman, upper case with boldsymbol:

$$\mathbf{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \tag{16}$$

Bold using bf, lower case:

$$\mathbf{abcdefghijklmnopqrstuvwxyz} \tag{17}$$

Bold using bf, upper case:

$$\mathbf{ABCDEFGHIJKLMNOPQRSTUVWXYZ} \tag{18}$$

Calligraphic (upper case only):

$$\mathcal{A}\cdot\mathcal{B}\cdot\mathcal{C}\cdot\mathcal{D}\cdot\mathcal{E}\cdot\mathcal{F}\cdot\mathcal{G}\cdot\mathcal{H}\cdot\mathcal{I}\cdot\mathcal{J}\cdot\mathcal{K}\cdot\mathcal{L}\cdot\mathcal{M}\cdot\mathcal{N}\cdot\mathcal{O}\cdot\mathcal{P}\cdot\mathcal{Q}\cdot\mathcal{R}\cdot\mathcal{S}\cdot\mathcal{T}\cdot\mathcal{U}\cdot\mathcal{V}\cdot\mathcal{W}\cdot\mathcal{X}\cdot\mathcal{Y}\cdot\mathcal{Z} \tag{19}$$

Calligraphic (upper case only) with boldsymbol:

$$\boldsymbol{\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}} \tag{20}$$

Binary operators:

$$\amalg * \triangle \bullet \cap \cdot \circ \cup \dagger \ddagger \div \mp \odot \ominus \oplus \oslash \otimes \pm \setminus \sqcap \sqcup \star \times \triangleleft \triangleright \uplus \vee \wedge \wr \tag{21}$$

Unknown symbol in Word: $\diamond\ \bigtriangledown$
Completely disappears in Word: $\bigcirc$

Binary operators with boldsymbol:

$$\boldsymbol{\amalg * \triangle \bullet \cap \cdot \circ \cup \dagger \ddagger \div \mp \odot \ominus \oplus \oslash \otimes \pm \setminus \sqcap \sqcup \star \times \triangleleft \triangleright \uplus \vee \wedge \wr} \tag{22}$$

Unknown symbol in Word: $\diamond\bigtriangledown$
Completely disappears in Word: $\bigcirc$

Relations:

$$\approx \asymp \bowtie \cong \dashv \doteq \equiv \geq \gg \leq \ll \frown \mid \models \parallel \perp \prec \preceq \propto \sim \simeq \smile \succ \succeq \vdash \sqsubseteq \sqsupseteq \subset \subseteq \supset \supseteq \in \ni \tag{23}$$

Relations with boldsymbol:

$$\approx\asymp\bowtie\cong\dashv\doteq\equiv\geq\gg\leq\ll\frown\mid\models\parallel\perp\prec\preceq\propto\sim\simeq\smile\succ\succeq\vdash\sqsubseteq\sqsupseteq\subset\subseteq\supset\supseteq\in\ni \tag{24}$$

Negated relations:

$$\not\approx\not\asymp\not\bowtie\not\cong\not\dashv\not=\not\equiv\not\geq\not\gg\not\leq\not\ll\not\frown\not\mid\not\models\not\parallel\not\perp\not\prec\not\preceq\not\propto\not\sim\not\simeq\not\smile\not\succ\not\succeq\not\vdash\not\sqsubseteq\not\sqsupseteq\not\subset\not\subseteq\not\supset\not\supseteq\not\in\not\ni\not<\not>\not=\not\neq\notin \tag{25}$$

Negated, with boldsymbol:

$$\not\approx\not\asymp\not\bowtie\not\cong\not\dashv\not=\not\equiv\not\geq\not\gg\not\leq\not\ll\not\frown\not\mid\not\models\not\parallel\not\perp\not\prec\not\preceq\not\propto\not\sim\not\simeq\not\smile\not\succ\not\succeq\not\vdash\not\sqsubseteq\not\sqsupseteq\not\subset\not\subseteq\not\supset\not\supseteq\not\in\not\ni\not<\not>\not=\not\neq\notin \tag{26}$$

Arrows:

$$\Downarrow\downarrow\hookleftarrow\hookrightarrow\leftarrow\Leftarrow\Leftrightarrow\leftrightarrow\longleftarrow\Longleftarrow\longleftrightarrow\Longleftrightarrow\longmapsto\Longrightarrow\longrightarrow\mapsto\nearrow\nwarrow\Rightarrow\rightarrow\searrow\swarrow\uparrow\Uparrow\updownarrow\Updownarrow \tag{27}$$

$$\leftharpoonup\leftharpoondown\rightharpoonup\rightharpoondown\rightleftharpoons \tag{28}$$

Arrows with boldsymbol:

$$\Downarrow\downarrow\hookleftarrow\hookrightarrow\leftarrow\Leftarrow\Leftrightarrow\leftrightarrow\longleftarrow\Longleftarrow\longleftrightarrow\Longleftrightarrow\longmapsto\Longrightarrow\longrightarrow\mapsto\nearrow\nwarrow\Rightarrow\rightarrow\searrow\swarrow\uparrow\Uparrow\updownarrow\Updownarrow \tag{29}$$

$$\leftharpoonup\leftharpoondown\rightharpoonup\rightharpoondown\rightleftharpoons \tag{30}$$

Letter like symbols:

$$\parallel\perp\ell\exists\forall\hbar\Im\imath\jmath\partial\Re\top\wp\aleph\emptyset\angle\backslash\infty\nabla\neg\prime\surd\triangle\flat\natural\sharp\clubsuit\diamondsuit\heartsuit\spadesuit \tag{31}$$

Other with boldsymbol:

$$\boldsymbol{\parallel\perp\ell\exists\forall\hbar\Im\imath\jmath\partial\Re\top\wp\aleph\emptyset\angle\backslash\infty\nabla\neg\prime\surd\triangle\flat\natural\sharp\clubsuit\diamondsuit\heartsuit\spadesuit} \tag{32}$$

Variable sized operators:

$$\bigcap\bigcup\bigodot\bigoplus\bigotimes\bigsqcup\biguplus\bigvee\bigwedge\coprod\int\oint\prod\sum$$

$$\boldsymbol{\bigcap\bigcup\bigodot\bigoplus\bigotimes\bigsqcup\biguplus\bigvee\bigwedge\coprod\int\oint\prod\sum} \tag{33}$$

Function names:

$$\arccos\arcsin\arctan\arg\cos\cosh\cot\coth\csc\deg\det \tag{34}$$

$$\dim\exp\gcd\hom\inf\ker\lg\lim\liminf\limsup\ln\log \tag{35}$$

$$\max\min\Pr\sec\sin\sinh\sup\tan\tanh \tag{36}$$

Function names with boldsymbol:

$$\boldsymbol{\arccos\arcsin\arctan\arg\cos\cosh\cot\coth\csc\deg\det} \tag{37}$$

$$\boldsymbol{\dim\exp\gcd\hom\inf\ker\lg\lim\liminf\limsup\ln\log} \tag{38}$$

$$\boldsymbol{\max\min\Pr\sec\sin\sinh\sup\tan\tanh} \tag{39}$$

Those with under-subscript available:

$$\det_a \gcd_a \inf_a \lim_a \limsup_a \liminf_a \max_a \min_a \Pr_a \sup_a \tag{40}$$

Those with under-subscript available with boldsymbol:

$$\det_{\boldsymbol{a}} \gcd_{\boldsymbol{a}} \inf_{\boldsymbol{a}} \lim_{\boldsymbol{a}} \limsup_{\boldsymbol{a}} \liminf_{\boldsymbol{a}} \max_{\boldsymbol{a}} \min_{\boldsymbol{a}} \Pr_{\boldsymbol{a}} \sup_{\boldsymbol{a}} \tag{41}$$

Modulus, spacing is incorrect on the first of these in Word:

$$a \bmod b \qquad a \pmod b \tag{42}$$

Modulus allowed with boldsymbol:

$$\boldsymbol{a \bmod b} \qquad \boldsymbol{a \pmod b} \tag{43}$$

Accents and under/over. Most of these don't seem to work in Word but this should be investigated further as it may be a context issue.

$$\hat{a}\check{a}\dot{a}\acute{a}\ddot{a}\grave{a}\tilde{a}\mathring{a}\bar{a}\vec{a}\widehat{aaa}\widetilde{aaa}\overline{aaa}\underline{aaa}\overbrace{aaa}\underbrace{aaa} \tag{44}$$

Accents and under/over with boldsymbol:

$$\boldsymbol{\hat{a}\check{a}\dot{a}\acute{a}\ddot{a}\grave{a}\tilde{a}\mathring{a}\bar{a}\vec{a}\widehat{aaa}\widetilde{aaa}\overline{aaa}\underline{aaa}\overbrace{aaa}\underbrace{aaa}} \tag{45}$$

Symbols left and right can be applied to. None of the arrows stretch in Word, could be context.

$$\left(\frac{1}{2}\right) \left[\frac{1}{2}\right] \left\{\frac{1}{2}\right\} \left|\frac{1}{2}\right| \left\lfloor\frac{1}{2}\right\rfloor \left\lceil\frac{1}{2}\right\rceil \left\langle\frac{1}{2}\right\rangle \left\uparrow\frac{1}{2}\right\uparrow \left\downarrow\frac{1}{2}\right\downarrow \left\updownarrow\frac{1}{2}\right\updownarrow \left\Uparrow\frac{1}{2}\right\Uparrow \left\Downarrow\frac{1}{2}\right\Downarrow \left\Updownarrow\frac{1}{2}\right\Updownarrow \tag{46}$$

Incorrect in both Word and MathJax:

$$\left/\frac{1}{2}\right\backslash \tag{47}$$

Symbols left and right can be applied to with boldsymbol:

$$\left(\boldsymbol{\frac{1}{2}}\right) \left[\boldsymbol{\frac{1}{2}}\right] \left\{\boldsymbol{\frac{1}{2}}\right\} \left|\boldsymbol{\frac{1}{2}}\right| \left\lfloor\boldsymbol{\frac{1}{2}}\right\rfloor \left\lceil\boldsymbol{\frac{1}{2}}\right\rceil \left\langle\boldsymbol{\frac{1}{2}}\right\rangle \left\uparrow\boldsymbol{\frac{1}{2}}\right\uparrow \left\downarrow\boldsymbol{\frac{1}{2}}\right\downarrow \left\updownarrow\boldsymbol{\frac{1}{2}}\right\updownarrow \left\Uparrow\boldsymbol{\frac{1}{2}}\right\Uparrow \left\Downarrow\boldsymbol{\frac{1}{2}}\right\Downarrow \left\Updownarrow\boldsymbol{\frac{1}{2}}\right\Updownarrow \tag{48}$$

Incorrect in both Word and MathJax:

$$\left/\boldsymbol{\frac{1}{2}}\right\backslash \tag{49}$$

Manual sizing. Word doesn't seem to honour these unless there is something of a specific height inside - perhaps they end up mapping to matching brackets? Find out.

$$\big(\big)\big[\big]\big\{\big\}\big\lfloor\big\rfloor\big\lceil\big\rceil\big\langle\big\rangle\big/\big\backslash\big|\big\|\big\uparrow\big\Uparrow\big\downarrow\big\Downarrow\big\updownarrow\big\Updownarrow \tag{50}$$

$$\Big(\Big)\Big[\Big]\Big\{\Big\}\Big\lfloor\Big\rfloor\Big\lceil\Big\rceil\Big\langle\Big\rangle\Big/\Big\backslash\Big|\Big\|\Big\uparrow\Big\Uparrow\Big\downarrow\Big\Downarrow\Big\updownarrow\Big\Updownarrow \tag{51}$$

$$() [] \{\} \lfloor\rfloor \lceil\rceil \langle\rangle / \backslash \| \uparrow \Uparrow \downarrow \Downarrow \updownarrow \Updownarrow \tag{52}$$

$$() [] \{\} \lfloor\rfloor \lceil\rceil \langle\rangle / \backslash \| \uparrow \Uparrow \downarrow \Downarrow \updownarrow \Updownarrow \tag{53}$$

Dots:

$$a \ldots a \quad a \vdots a \quad a \cdots a \quad a \ddots a \tag{54}$$

Dots with boldsymbol:

$$\boldsymbol{a \ldots a} \quad \boldsymbol{a \vdots a} \quad \boldsymbol{a \cdots a} \quad \boldsymbol{a \ddots a} \tag{55}$$

Horizontal spacing:

$$|\,|\,|\,|\,|\,|\quad|\qquad| \tag{56}$$

4.1.1 AMS additional: alphabets

Blackboard bold, upper case only (no boldsymbol version available as standard):

$$\mathbb{A} \cdot \mathbb{B} \cdot \mathbb{C} \cdot \mathbb{D} \cdot \mathbb{E} \cdot \mathbb{F} \cdot \mathbb{G} \cdot \mathbb{H} \cdot \mathbb{I} \cdot \mathbb{J} \cdot \mathbb{K} \cdot \mathbb{L} \cdot \mathbb{M} \cdot \mathbb{N} \cdot \mathbb{O} \cdot \mathbb{P} \cdot \mathbb{Q} \cdot \mathbb{R} \cdot \mathbb{S} \cdot \mathbb{T} \cdot \mathbb{U} \cdot \mathbb{V} \cdot \mathbb{W} \cdot \mathbb{X} \cdot \mathbb{Y} \cdot \mathbb{Z} \tag{57}$$

Math script, upper case only:

$$\mathcal{A} \cdot \mathcal{B} \cdot \mathcal{C} \cdot \mathcal{D} \cdot \mathcal{E} \cdot \mathcal{F} \cdot \mathcal{G} \cdot \mathcal{H} \cdot \mathcal{I} \cdot \mathcal{J} \cdot \mathcal{K} \cdot \mathcal{L} \cdot \mathcal{M} \cdot \mathcal{N} \cdot \mathcal{O} \cdot \mathcal{P} \cdot \mathcal{Q} \cdot \mathcal{R} \cdot \mathcal{S} \cdot \mathcal{T} \cdot \mathcal{U} \cdot \mathcal{V} \cdot \mathcal{W} \cdot \mathcal{X} \cdot \mathcal{Y} \cdot \mathcal{Z} \tag{58}$$

Math script, upper case only with boldsymbol:

$$\boldsymbol{\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}} \tag{59}$$

Math Frak, upper case only:

$$\mathfrak{A} \cdot \mathfrak{B} \cdot \mathfrak{C} \cdot \mathfrak{D} \cdot \mathfrak{E} \cdot \mathfrak{F} \cdot \mathfrak{G} \cdot \mathfrak{H} \cdot \mathfrak{I} \cdot \mathfrak{J} \cdot \mathfrak{K} \cdot \mathfrak{L} \cdot \mathfrak{M} \cdot \mathfrak{N} \cdot \mathfrak{O} \cdot \mathfrak{P} \cdot \mathfrak{Q} \cdot \mathfrak{R} \cdot \mathfrak{S} \cdot \mathfrak{T} \cdot \mathfrak{U} \cdot \mathfrak{V} \cdot \mathfrak{W} \cdot \mathfrak{X} \cdot \mathfrak{Y} \cdot \mathfrak{Z} \tag{60}$$

Math Frak, upper case only with boldsymbol:

$$\boldsymbol{\mathfrak{ABCDEFGHIJKLMNOPQRSTUVWXYZ}} \tag{61}$$

4.1.2 AMS additional: symbols

AMS arrows:

$$\circlearrowleft \circlearrowright \curvearrowleft \curvearrowright \dashleftarrow \dashrightarrow \downdownarrows \leftrightsquigarrow \lhd \rightleftarrows \rightrightarrows \rightsquigarrow \Rsh \twoheadleftarrow \twoheadrightarrow \upuparrows \upharpoonleft \downharpoonleft \rightleftharpoons \leftrightarrows \restriction \tag{62}$$

AMS arrows with boldsymbol

$$\boldsymbol{\circlearrowleft \circlearrowright \curvearrowleft \curvearrowright \dashleftarrow \dashrightarrow \downdownarrows \leftrightsquigarrow \lhd \rightleftarrows \rightrightarrows \rightsquigarrow \Rsh \twoheadleftarrow \twoheadrightarrow \upuparrows \upharpoonleft \downharpoonleft \rightleftharpoons \leftrightarrows \restriction} \tag{63}$$

AMS negated arrows:

$$\nLeftarrow \nleftarrow \nLeftrightarrow \nleftrightarrow \nRightarrow \nrightarrow \tag{64}$$

AMS negated arrows with boldsymbol

$$\boldsymbol{\nLeftarrow \nleftarrow \nLeftrightarrow \nleftrightarrow \nRightarrow \nrightarrow} \tag{65}$$

AMS binary operation symbols:

$$\barwedge \boxdot \boxminus \boxplus \boxtimes \Cap \centerdot \circledast \circledcirc \circleddash \Cup \curlyvee \curlywedge \divideontimes \doublebarwedge \intercal \leftthreetimes \ltimes \rtimes \rightthreetimes \veebar \Vee \tag{66}$$

AMS binary operation symbols with boldsymbol

$$\barwedge \boxdot \boxminus \boxplus \boxtimes \Cap \centerdot \circledast \circledcirc \circleddash \Cup \curlyvee \curlywedge \divideontimes \doublebarwedge \intercal \leftthreetimes \ltimes \rtimes \rightthreetimes \veebar \Vee \tag{67}$$

AMS Greek and Hebrew letters:

$$F \varkappa \beth \daleth \tag{68}$$

AMS Greek and Hebrew letters with boldsymbol:

$$F \varkappa \beth \daleth \tag{69}$$

AMS delimiters:

$$\ulcorner \urcorner \llcorner \lrcorner \tag{70}$$

AMS delimiters with boldsymbol:

$$\ulcorner \urcorner \llcorner \lrcorner \tag{71}$$

AMS relational and negated relational symbols:

$$\backcong \backsim \backsimeq \because \between \bowtie \Bumpeq \circeq \curlyeqprec \curlyeqsucc \doteqdot \Doteq \eqcirc \fallingdotseq \multimap \pitchfork \precapprox \preccurlyeq \precsim \risingdotseq \shortmid \smallfrown \smallsmile \sqsubseteq \sqsupseteq \subseteqq \Subset \succapprox \succcurlyeq \succsim \therefore \thickapprox \thicksim \propto \trianglelefteq \trianglerighteq \vartriangle \vartriangleleft \vartriangleright \vdash \Vdash \VDash \tag{72}$$

$$\geqslant \leqslant \eqslantgtr \eqslantless \gg \ggg \gtrapprox \gtrdot \gtreqless \gtreqqless \gtrless \gtrsim \gvertneqq \lessapprox \lessdot \lesseqgtr \lesseqqgtr \lessgtr \lesssim \ll \lll \lnapprox \lneqq \nmid \nparallel \nshortmid \nshortparallel \nsim \nsubseteqq \nsupseteqq \ntriangleleft \ntrianglelefteq \ntriangleright \ntrianglerighteq \nvdash \nVdash \nVDash \precnapprox \precneqq \precnsim \subsetneqq \succnapprox \succneqq \succnsim \supsetneqq \varsubsetneq \varsubsetneqq \varsupsetneq \varsupsetneqq \tag{73}$$

$$\blacktriangleleft \blacktriangleright \nexists \nmid \nparallel \nshortmid \nshortparallel \nsim \nsubseteqq \nsupseteqq \ntriangleleft \ntrianglelefteq \ntriangleright \ntrianglerighteq \nvdash \nVdash \nVDash \precnapprox \precneqq \precnsim \subsetneqq \succnapprox \succneqq \succnsim \supsetneqq \varsubsetneq \varsubsetneqq \varsupsetneq \varsupsetneqq \tag{74}$$

AMS relational and negated relational symbols with boldsymbol:

$$\backcong \backsim \backsimeq \because \between \bowtie \Bumpeq \circeq \curlyeqprec \curlyeqsucc \doteqdot \Doteq \eqcirc \fallingdotseq \multimap \pitchfork \precapprox \preccurlyeq \precsim \risingdotseq \shortmid \smallfrown \smallsmile \sqsubseteq \sqsupseteq \subseteqq \Subset \succapprox \succcurlyeq \succsim \therefore \thickapprox \thicksim \propto \trianglelefteq \trianglerighteq \vartriangle \vartriangleleft \vartriangleright \vdash \Vdash \VDash \tag{75}$$

$$\geqslant \leqslant \eqslantgtr \eqslantless \gg \ggg \gtrapprox \gtrdot \gtreqless \gtreqqless \gtrless \gtrsim \gvertneqq \lessapprox \lessdot \lesseqgtr \lesseqqgtr \lessgtr \lesssim \ll \lll \lnapprox \lneqq \nmid \nparallel \nshortmid \nshortparallel \nsim \nsubseteqq \nsupseteqq \ntriangleleft \ntrianglelefteq \ntriangleright \ntrianglerighteq \nvdash \nVdash \nVDash \precnapprox \precneqq \precnsim \subsetneqq \succnapprox \succneqq \succnsim \supsetneqq \varsubsetneq \varsubsetneqq \varsupsetneq \varsupsetneqq \tag{76}$$

$$\blacktriangleleft \blacktriangleright \nexists \nmid \nparallel \nshortmid \nshortparallel \nsim \nsubseteqq \nsupseteqq \ntriangleleft \ntrianglelefteq \ntriangleright \ntrianglerighteq \nvdash \nVdash \nVDash \precnapprox \precneqq \precnsim \subsetneqq \succnapprox \succneqq \succnsim \supsetneqq \varsubsetneq \varsubsetneqq \varsupsetneq \varsupsetneqq \tag{77}$$

AMS other symbols:

$$\diagdown \bigstar \blacklozenge \blacksquare \blacktriangle \blacktriangledown \diagup \eth \Diamond \mho \square \triangledown \varnothing \vartriangle \Bbbk \circledR \circledS \complement \dashv \hbar \hbar \nexists \sphericalangle \tag{78}$$

AMS other symbols, boldsymbol:

$$\diagdown \bigstar \blacklozenge \blacksquare \blacktriangle \blacktriangledown \diagup \eth \Diamond \mho \square \triangledown \varnothing \vartriangle \Bbbk \circledR \circledS \complement \dashv \hbar \hbar \nexists \sphericalangle \tag{79}$$

AMS multiple mathematical symbols

$$\iiint_{x=1}^{x=2} \quad \iiiint_{1}^{2} \quad \int \cdots \int_{x=1}^{x=2} \tag{80}$$

$$\iint_{1}^{2} \quad \sum_{\substack{p_1 p_2 \cdots p_n \\ p_i \text{is prime}}} \tag{81}$$

Stacked accents

$$\hat{\hat{a}}\breve{\breve{a}}\grave{\grave{a}}\bar{\bar{a}}\dot{\dot{a}}\check{\check{a}}\acute{\acute{a}}\tilde{\tilde{a}}\vec{\vec{a}}\ddot{\ddot{a}}\bar{\bar{a}}\dddot{a}\ddddot{a} \tag{82}$$

Dots based on surrounding text (or not, at end)

$$x_1, x_2, \ldots x_n \quad x_1 + x_2 + \cdots + x_n \quad x_1, x_2, \ldots \quad x_1 + x_2 + \cdots \quad x_1 \cdot x_2 \cdots \quad \iint \cdots \tag{83}$$

Extra function names and using newcommand:

$$\overline{\lim}\, \underline{\lim}\, \varinjlim\, \varprojlim\, \mathrm{boo}_{n \in N} \tag{84}$$

Extra modulus operators:

$$a \mod b \qquad a \pmod b \tag{85}$$

$$a \bmod b \quad a \pmod b \tag{86}$$

AMS horizontal spacing:

$$|\,|\,|\,|\,|\,|\,|\,|\,|\,|\,|\,| \tag{87}$$

4.2 Standard mathematical structures

Three different ways to inline $A^{2^n}_{i,j,k}$ $A^{2^n}_{i,j,k}$ $A^{2^n}_{i,j,k}$
Four different ways to displaymath.

$$\sum_{i=1}^{15} x_i^2 = x_1^2+x_2^2+x_3^2+x_4^2+x_5^2+x_6^2+x_7^2+x_8^2+x_9^2+x_{10}^2+x_{11}^2+x_{12}^2+x_{13}^2+x_{14}^2+x_{15}^2 \tag{100}$$

$$x_1^2 = x_2^2 = x_3^2 = x_4^2 = x_5^2 = x_6^2 = x_7^2 = x_8^2 = x_9^2 = x_{10}^2 = x_{11}^2 = x_{12}^2 = x_{13}^2 = x_{14}^2 = x_{15}^2$$

$$\prod_{i=1}^{15} x_i^2 = x_1^2 \;\; x_2^2 \;\; x_3^2 \;\; x_4^2 \;\; x_5^2 \;\; x_6^2 \;\; x_7^2 \;\; x_8^2 \;\; x_9^2 \;\; x_{10}^2 \;\; x_{11}^2 \;\; x_{12}^2 \;\; x_{13}^2 \;\; x_{14}^2 \;\; x_{15}^2$$

$$\prod_{i=1}^{15} x_i^2 = x_1^2 \cdot x_2^2 \cdot x_3^2 \cdot x_4^2 \cdot x_5^2 \cdot x_6^2 \cdot x_7^2 \cdot x_8^2 \cdot x_9^2 \cdot x_{10}^2 \cdot x_{11}^2 \cdot x_{12}^2 \cdot x_{13}^2 \cdot x_{14}^2 \cdot x_{15}^2$$

One of the forms is numbered equation 100.

$$\sqrt{\sum_{i=1}^{13} x_i^2} = \sqrt{x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2}$$

$$\sqrt{\sum_{i=1}^{13} x_i^2} = \left(x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2\right)^{\frac{1}{2}}$$

Now for an equation array:

$$\begin{aligned} \sum_{i=1}^{13} 2^i &= 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9 + 2^{10} + 2^{11} + 2^{12} + 2^{13} \\ &= 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512 + 1024 + 2048 + 4096 + 8192 \\ &= 16382 \end{aligned} \tag{101}$$

Here is a reference to the above equation (101).

$$\begin{aligned}\sum_{i=1}^{13} 2^i &= 2^1+2^2+2^3+2^4+2^5+2^6+2^7+2^8+2^9+2^{10}+2^{11}+2^{12}+2^{13}\\ &= 2+4+8+16+32+64+128+256+512+1024+2048+4096+8192\\ &= 16382 \qquad \text{text in formulas does not break}\end{aligned}$$

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{aligned}\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix} &= (1\times 4)-(2\times 3)\\ &= 4-6=-2\end{aligned}$$

$$\sqrt{a+\sqrt{\frac{b+c+d}{e}}+f}$$

$$\overline{\underline{a}+\overline{b+\underline{c}+d}+\overline{\overline{e}}}$$

$$\underbrace{a+\overbrace{b+c}^{=0}+d}_{\text{text}}$$

$$\xrightarrow{a}$$

$$\begin{matrix} a \\ b \end{matrix}\begin{pmatrix} a \\ b \end{pmatrix}$$

$$a=b=c=d=e=f=g=h=i=j=k=l=m=n=o=p=q=r=s=t$$
$$a<b<c<d<e<f<g<h<i<j<k<l<m<n<o<p<q<r<s<t$$
$$a>b>c>d>e>f>g>h>i>j>k>l>m>n>o>p>q>r>s>t$$
$$a\le b\le c\le d\le e\le f\le g\le h\le i\le j\le k\le l\le m\le n\le o\le p\le q\le r\le s\le t$$
$$a\ge b\ge c\ge d\ge e\ge f\ge g\ge h\ge i\ge j\ge k\ge l\ge m\ge n\ge o\ge p\ge q\ge r\ge s\ge t$$
$$a+b+c+d+e+f+g+h+i+j+k+l+m+n+o+p+q+r+s+t+u$$
$$a-b-c-d-e-f-g-h-i-j-k-l-m-n-o-p-q-r-s-t-u$$
$$a\times b\times c\times d\times e\times f\times g\times h\times i\times j\times k\times l\times m\times n\times o\times p\times q\times r\times s\times t\times u$$
$$a*b*c*d*e*f*g*h*i*j*k*l*m*n*o*p*q*r*s*t*u*v*w*x*y$$
$$a\cdot b\cdot c\cdot d\cdot e\cdot f\cdot g\cdot h\cdot i\cdot j\cdot k\cdot l\cdot m\cdot n\cdot o\cdot p\cdot q\cdot r\cdot s\cdot t\cdot u\cdot v\cdot w\cdot x\cdot y\cdot z\cdot a\cdot b\cdot c$$

$$a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d+\cfrac{1}{e+\cfrac{1}{f+\cfrac{1}{g+\frac{1}{h}}}}}}} \qquad a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d+\cfrac{1}{e+\cfrac{1}{f+\cfrac{1}{g+\frac{1}{h}}}}}}}$$

Testing new commands:

$$x_1x^2x_2$$

4.3 AMS mathematical structures

Fraction commands: display style in text style — $\frac{1}{2}$

$$\binom{n}{k} \quad \tbinom{n}{k} \tag{1}$$

$$\frac{1}{2} \quad \left[\frac{1}{2}\right] \quad a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d+\cfrac{1}{e+\cfrac{1}{f+\cfrac{1}{g+\frac{1}{h}}}}}}} \tag{2}$$

Matrices can be displayed in text $\left(\begin{smallmatrix} a & b & c \\ d & e & f \end{smallmatrix}\right)$ or in display with 6 different commands

$$\begin{matrix} r & s & t \\ u & v & w \\ x & y & x \end{matrix} \quad \begin{pmatrix} r & s & t \\ u & v & w \\ x & y & x \end{pmatrix} \quad \begin{bmatrix} r & s & t \\ u & v & w \\ x & y & x \end{bmatrix}$$

$$\begin{Bmatrix} r & s & t \\ u & v & w \\ x & y & x \end{Bmatrix} \quad \begin{vmatrix} r & s & t \\ u & v & w \\ x & y & x \end{vmatrix} \quad \begin{Vmatrix} r & s & t \\ u & v & w \\ x & y & x \end{Vmatrix}$$

Adjustments to roots (compared with the usual)

$$\sqrt[\beta]{t} \quad \sqrt[\beta]{t} \qquad \sqrt{x}+\sqrt{y}+\sqrt{z} \quad \sqrt{x}+\sqrt{y}+\sqrt{z} \tag{3}$$

Vertical bars

$$\left|\frac{1}{2}\right| \quad \left\|\frac{1}{2}\right\| \tag{4}$$

Boxed formulas, don't always work but that isn't an issue I suppose, we want to know what happens with very long formula

$$\boxed{a+b+c+d+e+f+g+h+i+j+k+l+m+n+o+p+q+r+s+t+u} \tag{5}$$

4.4 AMS multiline equations

4.4.1 Multline

Variant of equation for single formulas that are too long for one line.

$$\sum_{i=1}^{15} x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 + x_{14}^2 + x_{15}^2 \quad (6)$$

$$\sum_{i=1}^{15} x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 + x_{14}^2 + x_{15}^2 \quad (7)$$

$$\sum_{i=1}^{15} x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 + x_{14}^2 + x_{15}^2 \quad (8)$$

4.4.2 Split

Meant for single equations which do not fit on one line but allows alignment between lines. Split is used when already in mathmode and any numbering from the external mode will apply to the entire split as one line.

$$\sum_{i=1}^{15} x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 + x_{14}^2 + x_{15}^2 \quad (9)$$

4.4.3 Gather

Switches to mathmode and centers each line without alignment.

$$\sum_{i=1}^{15} x^i = x^1 + x^2 + x^3 + x^4 + x^5 + x^6 + x^7 + x^8 + x^9 + x^{10} + x^{11} + x^{12} + x^{13} + x^{14} + x^{15} \quad (*)$$

if $x = 2$ then

$$2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9 + 2^{10} + 2^{11} + 2^{12} + 2^{13} + 2^{14} + 2^{15}$$

And we can reference the equation (*).

4.4.4 Align

For use with multiple equations with horizontal alignment (usually on the equals sign or equivalent). Each line is split into aligned columns with the odd numbered columns being right justified and the even numbered left justified {rl rl rl...}. There is an unnumbered variant (use *).

$$\sum_{i=1}^{13} 2^i = 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8 + 2^9 + 2^{10} + 2^{11} + 2^{12} + 2^{13} \tag{*}$$

some calculator use later:

$$\begin{aligned} &= 2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512 + 1024 + 2048 + 4096 + 8192 \\ &= 16382 \qquad \text{text in formulas does not break} \end{aligned} \tag{†}$$

$$\begin{array}{lllllllll} a = 1 & b = 2 & c = 3 & d = 4 & e = 5 & f = 6 & g = 7 & h = 8 & i = 9 & j = 10 \\ a = 1 & b = 2 & c = 3 & d = 4 & e = 5 & f = 6 & g = 7 & h = 8 & i = 9 & j = 10 \end{array}$$

If you wish you can align on several equals signs. Theis means that effectively we have some && to make the empty "left hand sides":

$$\begin{aligned} 18 &= 2 \times 3 \times 3 & &= 2 \times 3^2 \\ 36 &= 2 \times 2 \times 3 \times 3 & &= 2^2 \times 3^2 \end{aligned}$$

But that looks ridiculous so the author would probably have chosen a variant align environment in which the spacing is controlled.

There are two types, flalign (this is written incorrectly in the book) and alignat. flalign inserts enough spacing to fill the column, it definitely isn't what we want here:

$$\begin{aligned} 18 &= 2 \times 3 \times 3 & &= 2 \times 3^2 \\ 36 &= 2 \times 2 \times 3 \times 3 & &= 2^2 \times 3^2 \end{aligned}$$

while alignat inserts no spacing automatically, it needs to know the number of columns

$$18 = 2 \times 3 \times 3 \qquad = 2 \times 3^2 \tag{10}$$

$$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2 \tag{11}$$

We can now make equation references too (10).

4.4.5 Nested: aligned, gathered

Variants on gather and align that can be used as building blocks when already in math-mode. We also demonstrate the unnumbered equation environment in AMS:

$$\begin{aligned} a &= 2, & b &= 4 \\ c &= 6, & d &= 8 \end{aligned} \qquad \text{suggests} \qquad \begin{aligned} e &= 10, \ldots \\ z &= 54 \end{aligned}$$

4.4.6 Cases

Easier way to produce equations with cases. Used when already in mathmode.

$$f(x) = \begin{cases} x^2 & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

4.4.7 Subnumbering

We can subnumber equations:

$$\sum_{i=1}^{15} x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 + x_{14}^2 + x_{15}^2 \tag{12a}$$

$$\sum_{i=1}^{15} x_i^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 + x_6^2 + x_7^2 + x_8^2 + x_9^2 + x_{10}^2 + x_{11}^2 + x_{12}^2 + x_{13}^2 + x_{14}^2 + x_{15}^2 \tag{12b}$$

4.5 AMS theorems

Theorem 4.1. *This is a numbered theorem (within the section) in the standard style and hence this text is in italics.*

Corollary 4.2. *This is a numbered corollary (numbered with theorems) also in the standard style.*

Proof. This is what a proof looks like! □

Definition 4.1. This is a numbered definition (numbered within section but not with theorems) and in the "definition" style. The title and number should be bold but the rest of the text should be normal font.

Note. This is an unnumbered note and is in the "remark" style.

5 Graphics

5.1 Standard graphics

This section looks only at graphics available without the graphics packages, that is, internal to vanilla LaTeX. Kopka and Daly [1] explain that "Standard LaTeXdoes actually contain the means to make primative drawings on its own" and they consider only the facets of picture that are in standard LaTeX, not those that require additional packages. This is what we test as a basic starting point in the vanilla stress test.

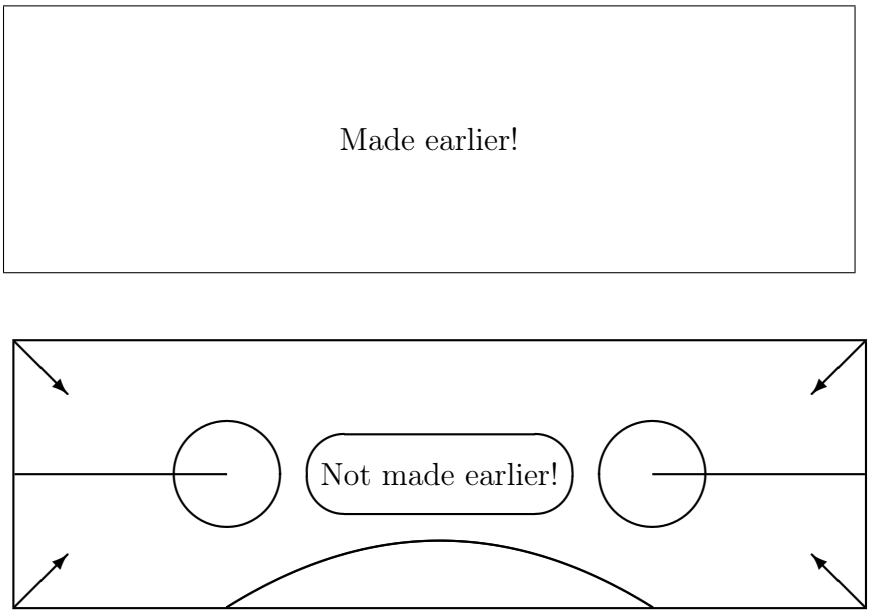

Figure 1: Example of picture environment

All graphics should be made to float with here, page and rule breaking allowed and referenced to ensure that the different formats can all deal with the graphics as are best suited. This is where figure 1 is.

5.2 Commutative diagrams: looking for a single, accepted way, which works

5.2.1 array

Mathjax can't render any of the specialist packages - is this still true? MathJax advice was to use array as in figure 2.

$$\begin{array}{ccc} A & \xrightarrow{f} & B \\ \downarrow{\scriptstyle g} & & \downarrow{\scriptstyle g'} \\ A^* & \xrightarrow{f^*} & B^* \end{array}$$

Figure 2: Commuting diagram

5.3 Graphicx package

This is copied over from the experiments made elsewhere. When using these methods we should be able to insert jpg (figure 3), png (figure 4) and pdf (figure 5)

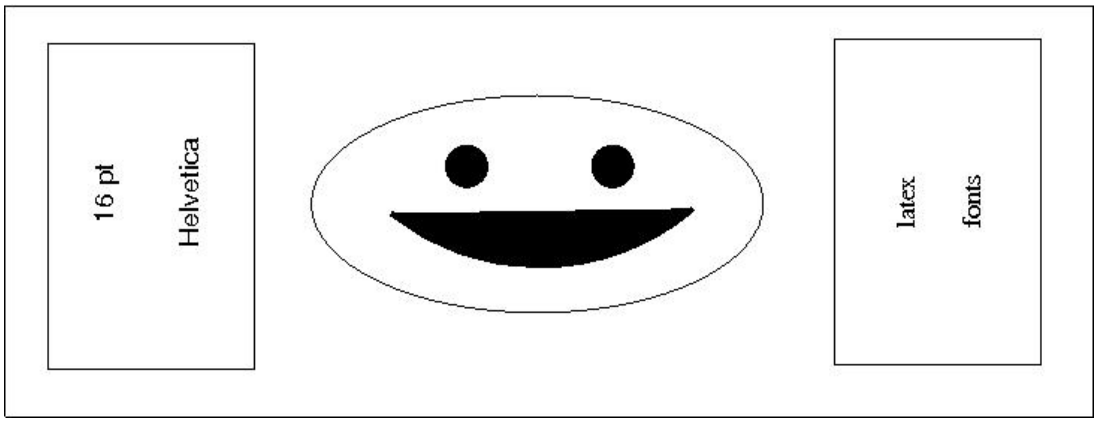

Figure 3: A jpg

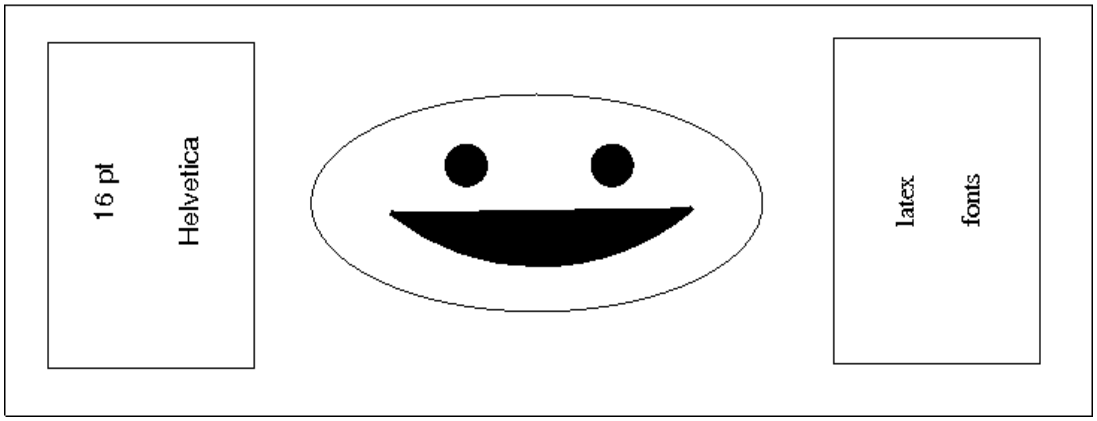

Figure 4: A png

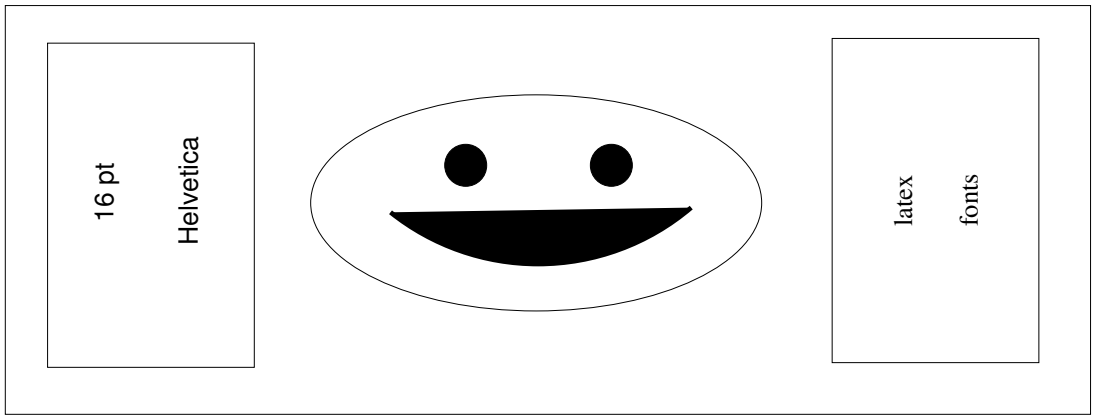

Figure 5: A pdf

And the last thing I do is to reference an equation I used a long while ago (10).

References

[1] Kopka, H. and Daly, P., *A Guide to LaTeX*. Pearson Education Ltd., 1999