LaTeX Math for Undergrads

Rule One Any mathematics at all, even a single character, gets a mathematical setting. Thus, for "the value of x is 7" enter `the value of $x$ is $7$`.

Template Your document should contain at least this.

```
\documentclass{article}
\usepackage{mathtools,amssymb,amsthm} % imports amsmath

\begin{document}
  --document body here--
\end{document}
```

Common constructs

x^2	`x^2`	$\sqrt{2}$, $\sqrt[n]{3}$	`\sqrt{2}`, `\sqrt[n]{3}`
$x_{i,j}$	`x_{i,j}`	$\frac{2}{3}$, $2/3$	`\frac{2}{3}`, `2/3`

Calligraphic letters Use as in `$\mathcal{A}$`.

$$\mathcal{ABCDEFGHIJKLMNOPQRSTUVWXYZ}$$

Get script letters, such as $\mathscr{P}$ from `$\mathscr{P}$`, by putting `\usepackage{mathrsfs}` in the preamble.

Greek

α	`\alpha`	ξ, Ξ	`\xi`, `\Xi`
β	`\beta`	o	`o`
γ, Γ	`\gamma`, `\Gamma`	π, Π	`\pi`, `\Pi`
δ, Δ	`\delta`, `\Delta`	ϖ	`\varpi`
ϵ	`\epsilon`	ρ	`\rho`
ε	`\varepsilon`	ϱ	`\varrho`
ζ	`\zeta`	σ, Σ	`\sigma`, `\Sigma`
η	`\eta`	ς	`\varsigma`
θ Θ	`\theta`, `\Theta`	τ	`\tau`
ϑ	`\vartheta`	υ, Υ	`\upsilon`, `\Upsilon`
ι	`\iota`	ϕ, Φ	`\phi`, `\Phi`
κ	`\kappa`	φ	`\varphi`
λ Λ	`\lambda`, `\Lambda`	χ	`\chi`
μ	`\mu`	ψ, Ψ	`\psi`, `\Psi`
ν	`\nu`	ω, Ω	`\omega`, `\Omega`

Sets and logic

$\cup$	`\cup`	$\mathbb{R}$	`\mathbb{R}`	$\forall$	`\forall`
$\cap$	`\cap`	$\mathbb{Z}$	`\mathbb{Z}`	$\exists$	`\exists`
$\subset$	`\subset`	$\mathbb{Q}$	`\mathbb{Q}`	$\neg$	`\neg`
$\subseteq$	`\subseteq`	$\mathbb{N}$	`\mathbb{N}`	$\vee$	`\vee`
$\supset$	`\supset`	$\mathbb{C}$	`\mathbb{C}`	$\wedge$	`\wedge`
$\supseteq$	`\supseteq`	$\varnothing$	`\varnothing`	$\vdash$	`\vdash`
$\in$	`\in`	$\emptyset$	`\emptyset`	$\models$	`\models`
$\notin$	`\notin`	$\aleph$	`\aleph`	$\setminus$	`\setminus`

Negate an operator, as in $\not\subset$, with `\not\subset`. Get the set complement A^{c} with `A^{\mathsf{c}}` (or $A^{\complement}$ with `A^{\complement}`, or $\overline{A}$ with `\overline{A}`).

Decorations

f'	`f'`	$\dot{a}$	`\dot{a}`	$\tilde{x}$	`\tilde{x}`
f''	`f''`	$\ddot{a}$	`\ddot{a}`	$\bar{x}$	`\bar{x}`
Σ^*	`\Sigma^{*}`	$\hat{x}$	`\hat{x}`	$\vec{x}$	`\vec{x}`

If the decorated letter is i or j then some decorations need `\imath` or `\jmath`, as in `\vec{\imath}`. Some authors use boldface for vectors: `\boldsymbol{x}`.

Entering `\overline{x+y}` produces $\overline{x+y}$, and `\widehat{x+y}` gives $\widehat{x+y}$. Comment on an expression as here (there is also `\overbrace{..}`).

$$\underbrace{x+y}_{|A|} \quad \texttt{\underbrace\{x+y\}\_\{|A|\}}$$

Dots Use low dots in a list $\{0, 1, 2, \ldots\}$, entered as `\{0,1,2,\ldots\}`. (If you use `\ldots` in plain text as with `London, Paris, \ldots{}\,.` then note the thinspace `\,` before the period.) Use centered dots in a sum or product $1+\cdots+100$, entered as `1+\cdots+100`. You can also get vertical dots `\vdots` and diagonal dots `\ddots`.

Roman names Enter `\tan(x)`, with a backslash, instead of `tan(x)`. These get the same treatment.

sin	`\sin`	sinh	`\sinh`	arcsin	`\arcsin`
cos	`\cos`	cosh	`\cosh`	arccos	`\arccos`
tan	`\tan`	tanh	`\tanh`	arctan	`\arctan`
sec	`\sec`	coth	`\coth`	min	`\min`
csc	`\csc`	det	`\det`	max	`\max`
cot	`\cot`	dim	`\dim`	inf	`\inf`
exp	`\exp`	ker	`\ker`	sup	`\sup`
log	`\log`	deg	`\deg`	lim inf	`\liminf`
ln	`\ln`	arg	`\arg`	lim sup	`\limsup`
lg	`\lg`	gcd	`\gcd`	lim	`\lim`

Other symbols

$<$	`<`	$\angle$	`\angle`	$\cdot$	`\cdot`
$\leq$	`\leq`	$\measuredangle$	`\measuredangle`	$\pm$	`\pm`
$>$	`>`	ℓ	`\ell`	$\mp$	`\mp`
$\geq$	`\geq`	$\parallel$	`\parallel`	$\times$	`\times`
$\neq$	`\neq`	45°	`45^{\circ}`	$\div$	`\div`
$\ll$	`\ll`	$\cong$	`\cong`	$*$	`\ast`
$\gg$	`\gg`	$\ncong$	`\ncong`	$\mid$	`\mid`
$\approx$	`\approx`	$\sim$	`\sim`	$\nmid$	`\nmid`
$\asymp$	`\asymp`	$\simeq$	`\simeq`	$n!$	`n!`
$\equiv$	`\equiv`	$\nsim$	`\nsim`	∂	`\partial`
$\prec$	`\prec`	$\oplus$	`\oplus`	∇	`\nabla`
$\preceq$	`\preceq`	$\ominus$	`\ominus`	$\hbar$	`\hbar`
$\succ$	`\succ`	$\odot$	`\odot`	$\circ$	`\circ`
$\succeq$	`\succeq`	$\otimes$	`\otimes`	$\star$	`\star`
$\propto$	`\propto`	$\oslash$	`\oslash`	$\surd$	`\surd`
$\doteq$	`\doteq`	$\upharpoonright$	`\upharpoonright`	✓	`\checkmark`

Use `a\mid b` for the divides relation, $a \mid b$, and `a\nmid b` for the negation, $a \nmid b$. Also use `\mid` to get set builder notation $\{a \in S \mid a \text{ is odd}\}$, with `\{a\in S\mid\text{$a$ is odd}\}`.

Arrows

$\to$	`\rightarrow`, `\to`	$\mapsto$	`\mapsto`
$\nrightarrow$	`\nrightarrow`	$\longmapsto$	`\longmapsto`
$\longrightarrow$	`\longrightarrow`	$\leftarrow$	`\leftarrow`
$\Rightarrow$	`\Rightarrow`	$\leftrightarrow$	`\leftrightarrow`
$\nRightarrow$	`\nRightarrow`	$\downarrow$	`\downarrow`
$\Longrightarrow$	`\Longrightarrow`	$\uparrow$	`\uparrow`
$\leadsto$	`\leadsto`	$\updownarrow$	`\updownarrow`

The right arrows in the first column have matching left arrows, such as `\nleftarrow`, and there are some other matches for down arrows, etc.