

# TeX Tricks

Math 347

May 23, 2022

## 1 The align(\*) environment

Introductory text

$$a^2 + b^2 = c^2$$

Here's a chain of inequalities

$$\begin{aligned} c^2 &= a^2 + b^2 \\ &\leq a^2 + b^2 + x^2 + y^2 \end{aligned}$$

Some numbered equations

$$\begin{aligned} c^2 &= a^2 + b^2 \\ &\leq a^2 + b^2 + x^2 + y^2 & (1) \\ &\leq (a+1)^2 + b^2 + x^2 + y^2 & (2) \end{aligned}$$

To refer to an equation, make sure to label it, then reference it using using the “ref” or “eqref” command: I am referencing equation 1 and also equation (2).

Multiple columns is nice too

$$\begin{array}{ll} c^2 = a^2 + b^2 & z^2 = x^2 + y^2 \\ n = (r, s) & C = \max(|t|, |\ell|) \end{array}$$

**Lemma 1.1.** *This is not a lemma*

By Fermat's Last Theorem, lemma 1.1 holds.

## 2 Delimiters

Standard parenthesis sizes are  $()$ . We change their size by  $()$ . Also  $()$ ,  $()$ , and  $()$ . Finally, the command  $()$  will automatically size parentheses. So

$$\begin{aligned}(a + b) &= c \\ (a^2 + b^2) &= c^2 \\ \left(\frac{a}{b}\right) &= c\end{aligned}$$

You can do the same with  $[]$  and  $\{\}$ :

$$\begin{aligned}\left[\frac{a}{b}\right] \\ \left\{\frac{a}{b}\right\}\end{aligned}$$

## 3 Miscellaneous

### 3.1 New Symbols

Here is a piecewise function

$$f(x) = \begin{cases} 0 & \text{if } x \text{ is irrational} \\ 1 & \text{if } x \text{ is rational} \end{cases}$$

Some other symbols:

Here is the statement of induction:

$$\varphi(0) \& (\forall n : \varphi(n) \rightarrow \varphi(n + 1)) \rightarrow \forall n : \varphi(n)$$

### 3.2 Display Style

Let's learn about displaystyle. If you have an equation that you want big symbols in, this should be helpful: Here's some text and an equation  $\frac{1 + \frac{1}{a}}{z - e^{5x^3}}$ . Some other places this is relevant is when using sums and integrals:  $\sum_{j=1}^{\infty} \frac{1}{j^2} \approx \int_1^{\infty} \frac{1}{x^2} dx$ . For comparison  $\frac{1 + \frac{1}{a}}{z - e^{5x^3}}$  and  $\sum_{j=1}^{\infty} \frac{1}{j^2} \approx \int_1^{\infty} \frac{1}{x^2} dx$ .

### 3.3 Graphics

Here's some more text and then there will be a graphic.

Without centering:

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Figure 1: This is a picture

With centering:

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Figure 2: This is the same picture

Text width (no centering):

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Figure 3: This is the same picture

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Figure 4: This is the same picture

### 3.4 Citations

Here is some more text and a citation [1].

## References

- [1] Simpson, Stephen G. 2010. *Subsystems of Second Order Arithmetic*. Cambridge: Cambridge University Press