Technical and math writing
or
How to write math like a pro

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Why write clearly?

- It helps you think clearly.
- It convinces others to believe in your work.
- It provides a record which you can refer to in the future.

Avoid the passive voice

In English, there's a difference between the active voice (e.g. "We now differentiate $f(x)$" or "Now differentiate $f(x)$") and the passive voice (e.g. "The function $f(x)$ must now be differentiated").

It's a good idea to write in the active voice as much as possible. The passive voice is more confusing, takes longer to express the same content, and distances you from the work.

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- *GOOD* “We now differentiate position to get velocity”.

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Make each word count.

Brevity is the soul of wit. –Shakespeare

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- $\boxed{\textit{BAD}}$ “In order to enable the obtaining of an even more accurate equation of projectile motion, *h* must be added to the function of *y* coordinate position in order to correct for the offset in which the arm of the robot is lifted from the surface of the ground in order for the arm to clear the table surface below the robot."
- $\boxed{\textit{GOOD}}$ “The center of the robot arm is located at $(0, h)$, so $\mathrm{py}(\theta) = r\cos\theta + h$.

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- $\boxed{\textit{BAD}}$ "Hence", "Thus", "In conclusion"
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One idea per sentence.

It is really easy to write run-on sentences in mathematics which seem really useful and explanatory and compelling but it's probably not a good idea because by the time the reader comes to the end of the sentence, if it ever ends, they may have completely forgotten what it was that you were intending to talk about at the beginning of where the sentence began and then you will have completely confused everyone. Or something.

One idea per sentence

- $\boxed{\textit{BAD}}$ “Firstly the value of *h* is given to us in units of centimeters but these are not the units we want for the projectile motion problem because the constant that is *g* for gravity will be given to us in terms of the units of meters which are the units which we know gravity in.”
- $\boxed{\textit{GOOD}}$
  - The height *h* is given in centimeters.
  - We will use meters as unit of distance because we are used to doing projectile motion problems in units of meters and seconds.
  - So we now convert *h* to meters.

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Expressions that stand out in the wrong way

You want to sound like a native speaker of technical English. To do so, you need to learn some informal rules of mathematical language.

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Expressions that stand out in the wrong way

- $\boxed{\textit{BAD}}$ "py(t) is a quadratic"
- $\boxed{\textit{GOOD}}$ "py(t) is quadratic in t" or "py(t) is a quadratic polynomial"

Is this a definition, or an equation?

We use the equals sign in two different ways in mathematics. In

$$f(x) = 7\sin x + 3$$

the equals sign means that $f(x)$ is now serving as a kind of abbreviation for the longer formula $7\sin x + 3$. This is a definition, not an equation.

You can't "solve this equation for x" because there's no new information here about x.

Is this a definition, or an equation?

Here are two equations:

$$\cos 2\theta = \cos^2\theta - \sin^2\theta \quad \text{and} \quad \cos\theta = \sin\theta$$

The equals sign means that these are relationships between two different expressions. Often, but not always, an equation in one variable determines the value of the variable.

For instance, the right-hand equation implies that $\theta = \pi/4$ or $\theta = 5\pi/4$, so we can "solve it for θ", but the left-hand equation is true for all θ, so we can't "solve for θ" in any meaningful sense.