MA 113 Prof. Ben Braun

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When you sit down:

1. Introduce yourself to the students sitting near you.

2. Discuss with your neighbors:

A: Why is the value of π a bit more than 3? i.e. why isn't $\pi = 5$? or 7.2? or something else?

B: Why is $\sin^2(x) + \cos^2(x) = 1$?
("My teacher told me" is not a good answer!)

C: Why is the Pythagorean Theorem true?

8/26/2016:

Talk with your neighbors:

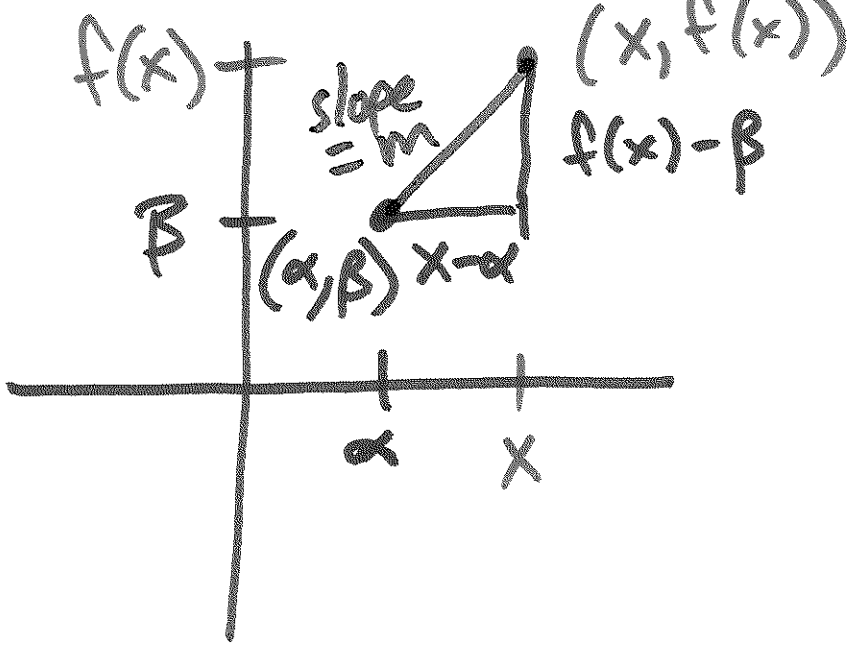
- without looking up the formula, how can you figure out the equation for converting °F to °Celsius?

When converting °F to °C, what should the function look like?

S's responses:

- Linear
- Point-slope
- $y = mx + b$
- Boiling/Freeze pts match
- Subtract 32

Def^{n}: A Function $f(x)$ is linear if there is a point (α, β) and a slope m so that



$$\frac{f(x)-\beta}{x-\alpha} = m.$$

Equivalently,

$$f(x)-\beta = m(x-\alpha).$$

point-slope form.

Q: Suppose I want to now write $f(x)$ as slope $\cdot x$ + y-intercept. what is y-intercept?

A: y-intercept is $\beta - m\alpha$.

$$f(x) = m(x-\alpha)+\beta$$
$$= mx + \underbrace{(-m\alpha+\beta)}_{\text{y-int.}}$$

Back to °F to °C.

Boiling pt. is 212°F + 100°C

Freezing pt is 32°F + 0°C

So, (212, 100) and (32,0) are on the graph of the conversion fn. = function.

Slope is $m = \frac{100-0}{212-32} = \frac{5}{9}$.

We have a choice: we can use either point.

i.e.
$$\left.\begin{array}{l} f(x) - 100 = \frac{5}{9}(x-212) \\ \text{or } f(x) - 0 = \frac{5}{9}(x-32) \end{array}\right\} \Rightarrow f(x) = \frac{5}{9}x - \frac{160}{9}$$

Q: How do I convert from y°C to corresponding x°F?

$$y = \frac{5}{9}(x-32) \Rightarrow \frac{9}{5}y = x - 32 \Rightarrow \frac{9}{5}y + 32 = x.$$

The property that let us compute the inverse here is one-to-one. (see defⁿ in book.)

Q: Suppose after t seconds, the temp. of a metal plate is $f(t) = 2t^3 - 6t^2 + 4t$ °C. Suppose plate breaks at 9/2 °C. When does it break?