

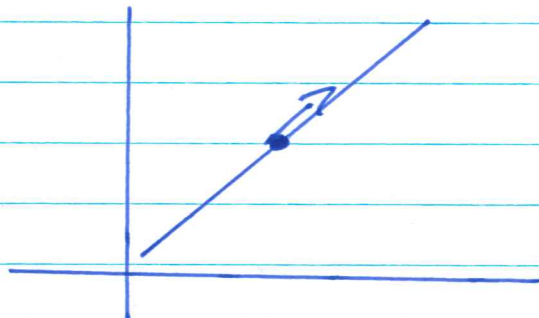
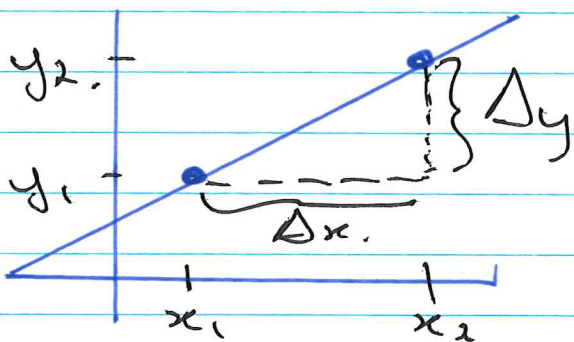
①

Sept. 9.

- diagnostic test on Webwork.
- MAPS survey.
- Put M190 in subject when emailing me.
- observe course outline and Learning Objectives.

Lines! ~~Why~~ What information do we need to draw a line?

Either 1) two points.
or 2) one point and a slope.



The Slope: $m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

2

Example: Find the equation of the line passing through $(-1, 1)$ and $(3, 2)$.

Find slope: $m = \frac{2-1}{3-(-1)} = \frac{1}{4}$.

Slope-y-intercept form: $y = mx + b$.

$$y = \frac{1}{4}x + b$$

Using a point: $(-1, 1)$

$$1 = \frac{1}{4}(-1) + b$$

$$5/4 = b$$

$$\Rightarrow y = \frac{1}{4}x + 5/4$$

Alternatively, we could use slope-point-form.

where (x_1, y_1) is any point on the line.

So, take $(3, 2)$.

$$y - 2 = \frac{1}{4}(x - 3)$$

3

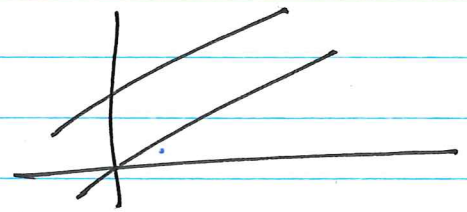
Clicker Q: Which of the following lines is parallel to $y - 1 = \frac{2}{3}(x - 2)$?

A) $y + 4 = \frac{3}{2}(x - 7)$

B) $y = -\frac{2}{3}(x + 1)$

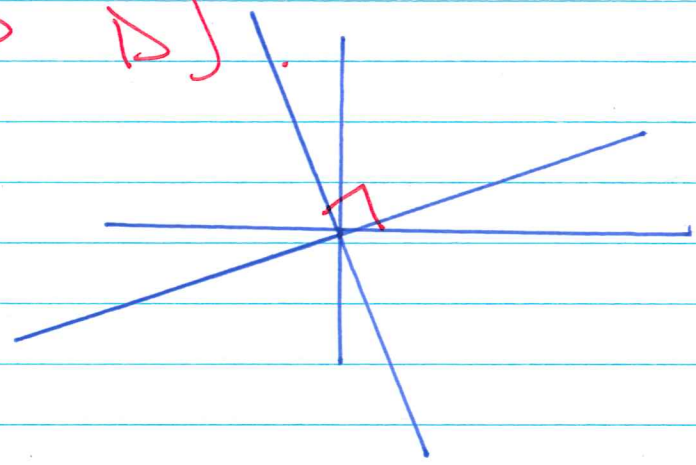
C) $y + 1 = \frac{2}{3}(x - 3)$ ~ same slope.

D) $y - 6 = -\frac{3}{2}(x + 4)$
negative reciprocal.



Clicker Q: Which is perpendicular?

\Rightarrow D)



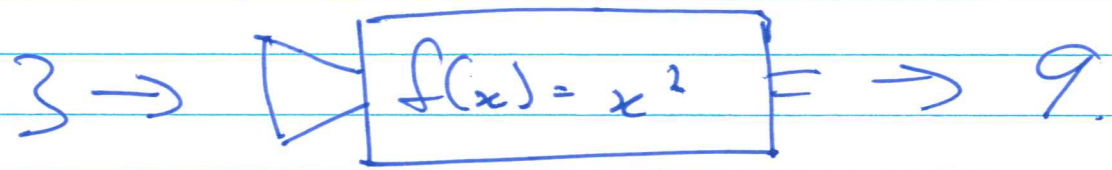
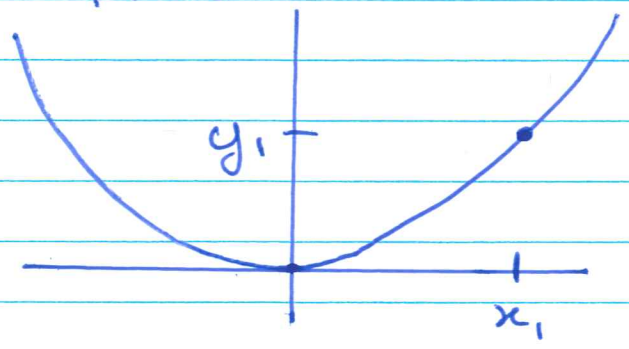
4

Functions: What is a function?

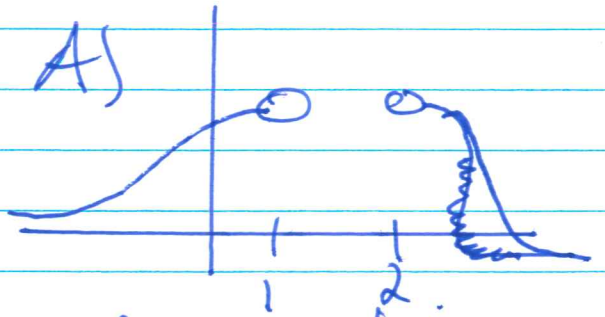
A function is a rule that takes an input and gives a unique output.

(only one y for each x)

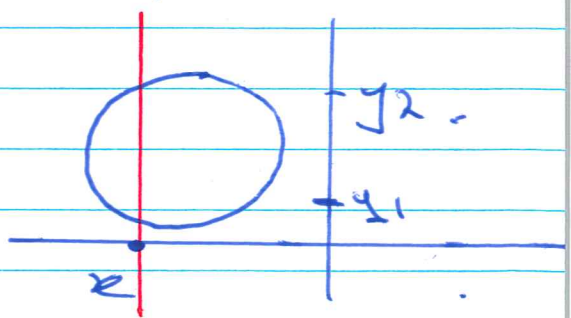
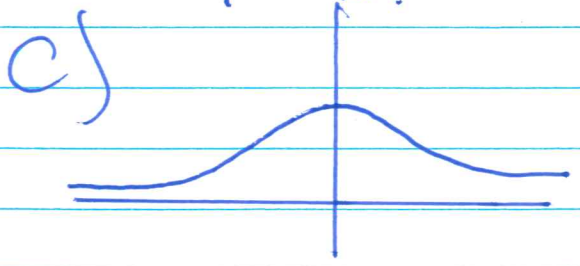
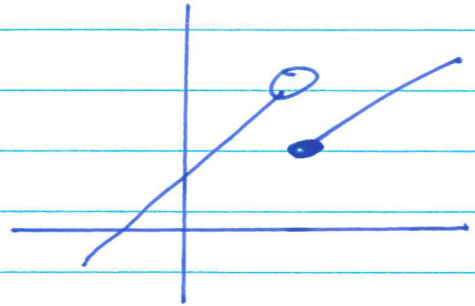
Example: $f(x) = x^2$.



Clicker Q: Which of the following is not a function.



B)



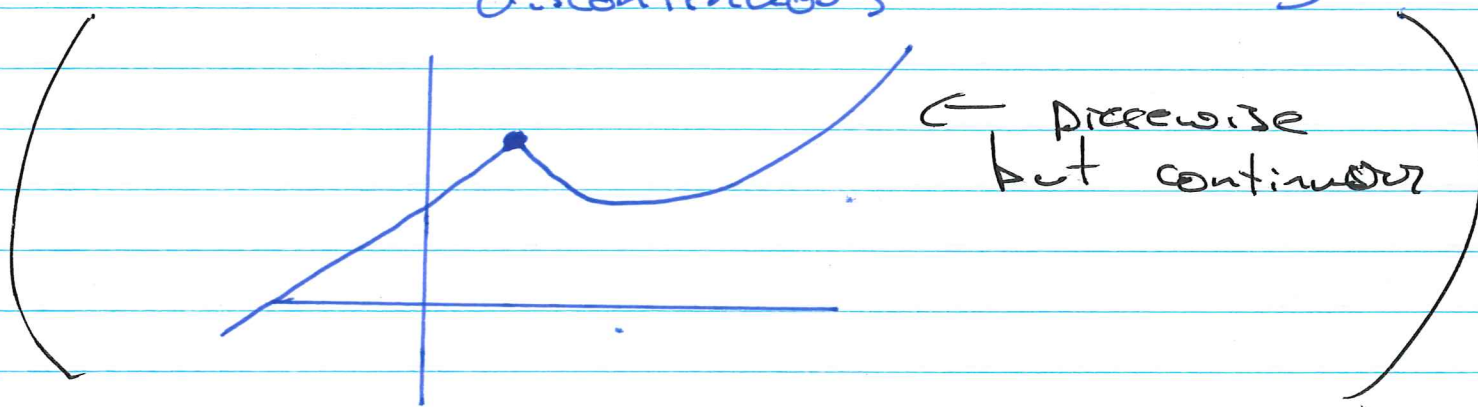
D

5

So D) has two outputs for one input. It fails the vertical line test.

A), B) are examples of piecewise functions.

(these two happen to be discontinuous)



The values we can input to a function form the domain.

The domain of B) and C) is

• all real numbers.

• \mathbb{R}

• $(-\infty, \infty)$

A) • $\{x \in \mathbb{R} : x < 1 \text{ or } x \geq 2\}$
• $(-\infty, 1) \cup (2, \infty)$

∈
"element of"

$(-\infty, 1)$ - does not include 1.

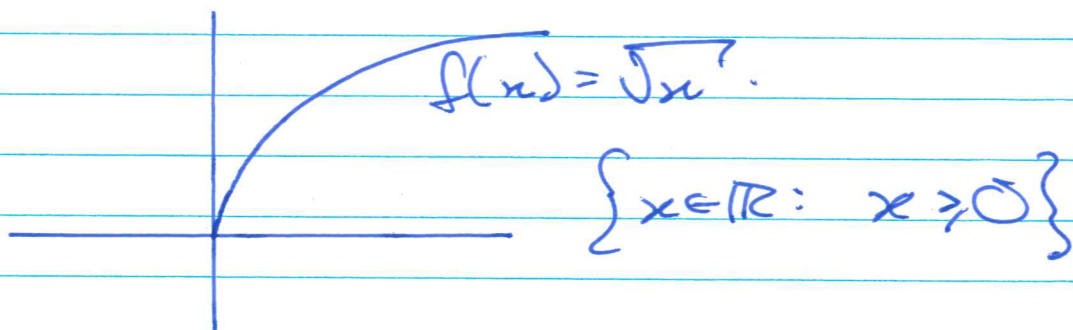
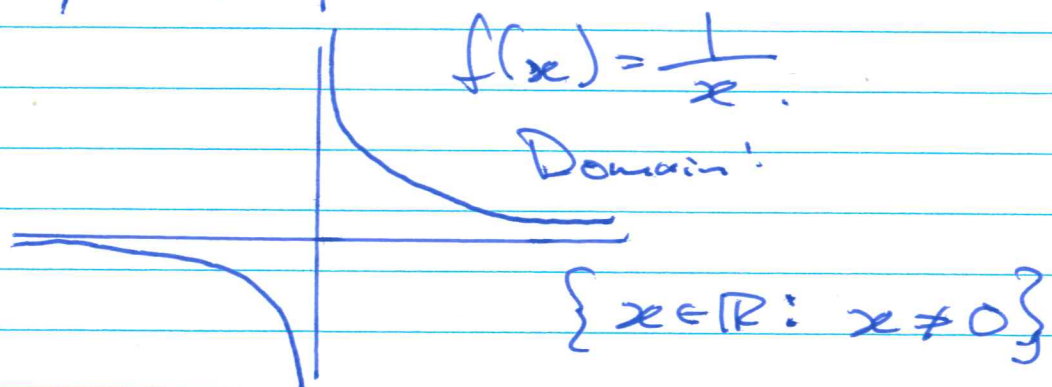
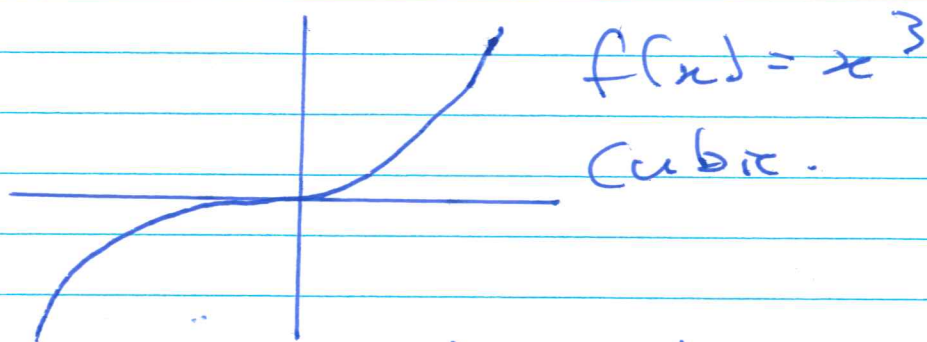
$(-\infty, 1]$ - does include 1

6

There are many kinds of functions.

- Polynomials.
- rational.
- trig / exp / log. (weeks 2, 3).

Example:



⑦.

Example: $f(x) = \frac{(x+1)(x-3)}{(x-3)}$

$$D = \{ x \in \mathbb{R} : x \neq 3 \}$$

If $x \neq 3$, we can cancel.

$$\frac{(x+1)(\cancel{x-3})}{(\cancel{x-3})} = x+1.$$

So, we can write $f(x)$ in another way,

$$f(x) = \begin{cases} x+1, & x \neq 3 \\ \text{undefined,} & x = 3 \end{cases}$$

