Warm Up

Write the equation of the line that is parallel to $3x - 5y = -2$ and goes through the point (5, -1).

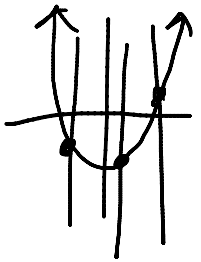
Section P.3

Functions and their graphs

Functions

Def. A function is a relationship where no two points have the same *x*-coordinate.

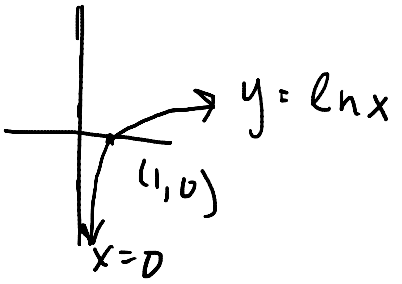
- Each *x*-coordinate is associate with at most one *y*-coordinate
- The graph passes the vertical line test



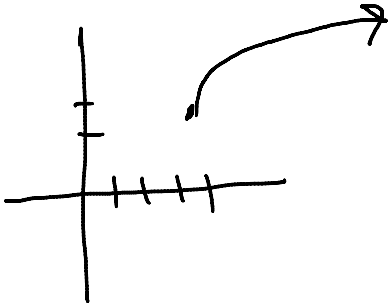
Domain → all possible values of *x* where the function is defined.

Range → all possible values that the function attains

Ex: Find the domain and range.



A) $y = \sqrt{x-4} + 2$



Domain:

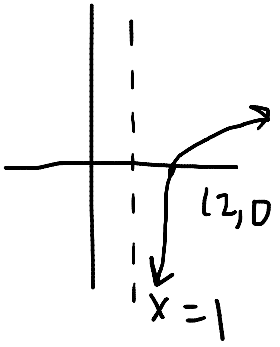
$4 \leq x$ $\quad x \in [4, \infty)$

$x \geq 4$

Range:

$x \geq 2$ $\quad [2, \infty)$

B) $y = ln(x-1)$



Domain:

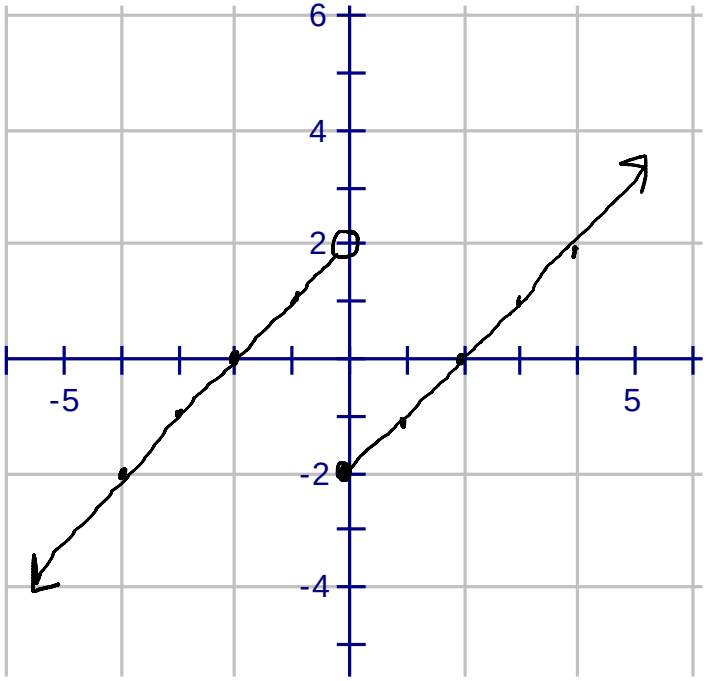
$(1, \infty) \rightarrow x > 1$

Range:

$\mathbb{R}$ $(-\infty, \infty)$

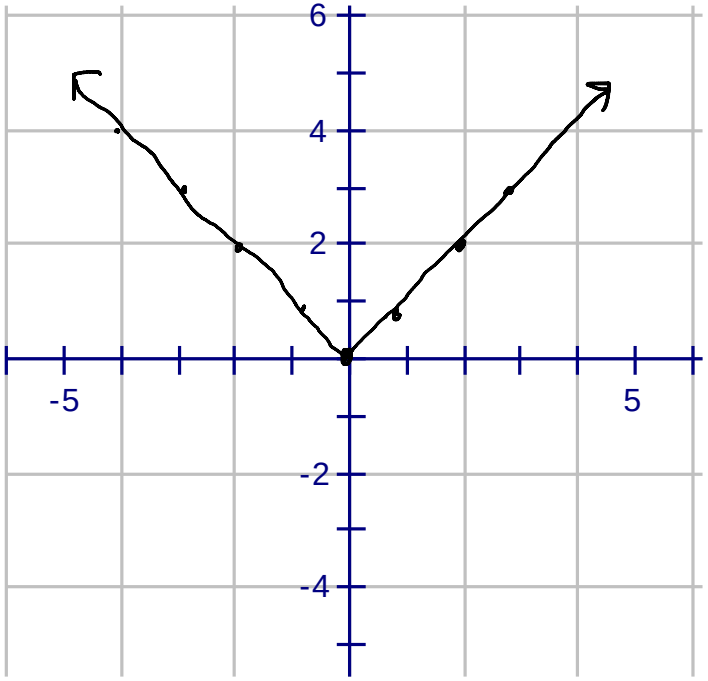
Def: A piecewise function is a function whose equation depends of the value of *x* where it is being evaluated.

Ex: Graph $f(x)=\begin{cases} x+2 & x<0 \\ x-2 & x\geq 0 \end{cases}$



The Absolute Value Function is a Piecewise function.

$$f(x) = |x| = \begin{cases} x & x \geq 0 \\ -x & x < 0 \end{cases}$$



Inverse Functions

- Def. A function is invertible if no two points have the same y-coordinate.
- Each y corresponds to at most one x
- The graph passes the horizontal line test
- To find the inverse, switch x and y, and then solve for y.

You may not find the equation for the inverse, even if the function is invertible

Ex: Let $f(x)=\dfrac{1}{2x-5}$. Find $f^{-1}(x)$

$$y=\frac{1}{2x-5}$$

$$(2y-5)(x)=\left(\frac{1}{2y-5}\right)(2y-5)$$

$$\frac{(2y-5)x}{x}=\frac{1}{x}$$

$$2y-5=\frac{1}{x}$$

$$+5 \qquad +5$$

$$\frac{2y}{2}=\frac{\frac{1}{x}+5}{2}$$

$$\boxed{y=\frac{\frac{1}{x}+5}{2}}$$

Domain of f ←→ Range of f^{-1}

Range of f ←→ Domain of f^{-1}

(distance as a function of time) → $d = f(t)$

becomes

(time as a function of distance) → $t = f^{-1}(d)$

Ex: Let $C = f(q)$ be the cost, in dollars, for Dunder Mifflin to produce q boxes of paper. Using correct units, explain the meaning of $f^{-1}(25) = 1000$.

Even and Odd Functions

- A function is odd if, for all *x* in the domain of *f*
  $f(-x) = -f(x)$
- A function is even if, for all *x* in the domain of *f*
  $f(-x) = f(x)$

Ex: Determine if $f(x) = \frac{1}{2}x^3$ is even or odd.

$f(-x) = \frac{1}{2}(-x)^3$

$f(-x) = -\frac{1}{2}x^3$ ODD

$\hookrightarrow -f(x)$

Ex: Determine if $f(x) = 3x^2 - 1$ is even or odd.

$f(-x) = 3(-x)^2 - 1$

$f(-x) = 3x^2 - 1 = f(x)$ EVEN

Homework

- P. 27 # 13 – 29 odd
- P. 349 # 23 – 29 odd