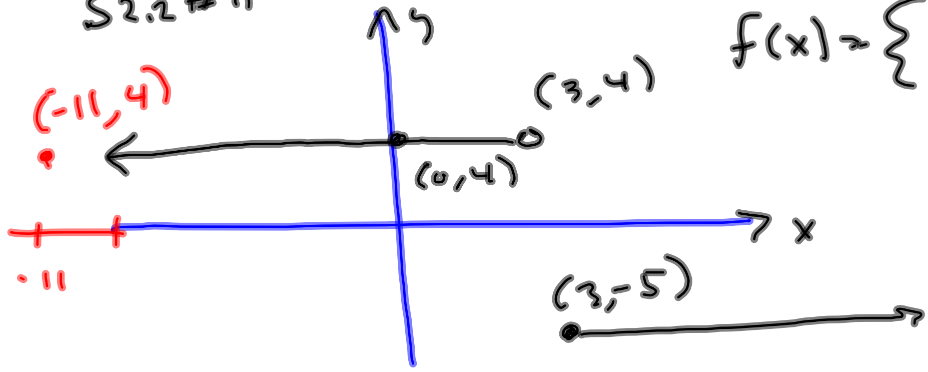
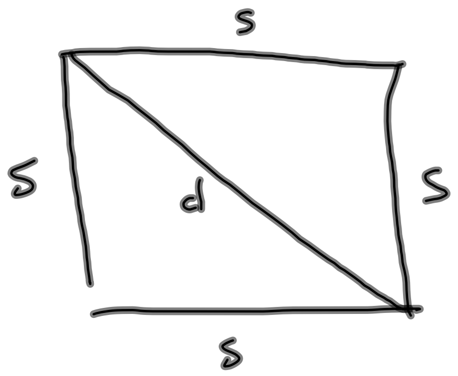
§2.2 #11

$$f(x) = \begin{cases} 4 & \text{if } x < 3 \\ -5 & \text{if } x \geq 3 \end{cases}$$



$f(-11) = 4$



P = Perimeter
A = Area
Find P as a function of side length, s.

$P = f(s) = 4s$

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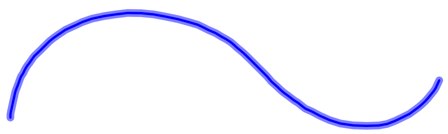
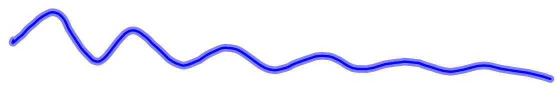
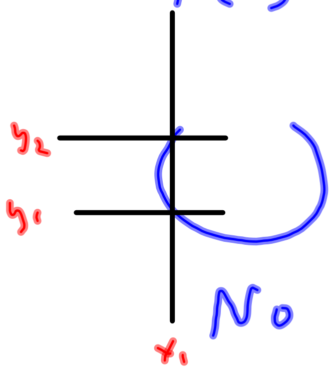


Yes



Yes



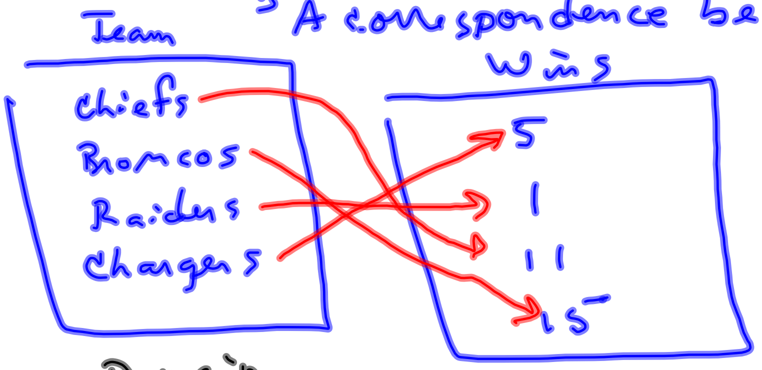
No

Note: Parabolas are U-shaped, not ⊂-shaped.

x_1 corresponds to y_1 and y_2, but $y_1 \neq y_2$.

This relation is not a function

↳ A correspondence between two sets



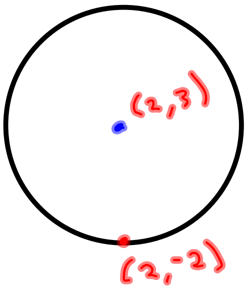
Mapping Diagram.

Domain
x-values

Range
y-values.

$R = \{$ (Chiefs, 11), (Broncos, 15), (Raiders, 1), (Chargers, 5) $\}$

Is R a function? Yes.



$(x-2)^2+(y-3)^2=25$

is the equation of this circle.

Not a function, but we use functions to describe it.

Solve for y:

$$(x-2)^2+(y-3)^2=25$$

$$(y-3)^2=25-(x-2)^2$$

$$\sqrt{(y-3)^2}=\sqrt{25-(x-2)^2}$$

$$|y-3|=\sqrt{25-(x-2)^2}$$

$$y-3=\sqrt{25-(x-2)^2} \quad \text{OR} \quad y-3=-\sqrt{25-(x-2)^2}$$

$$y-3=\pm\sqrt{25-(x-2)^2}$$

$$y=3\pm\sqrt{25-(x-2)^2}$$

Not a function.

Algebraic Proof:

$x=2 \Rightarrow y=3\pm\sqrt{25}=3\pm 5$

So $y=8$ OR $y=-2$

Here's a pair in the relation: pair of pairs

(2,8)

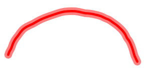
(2,-3)

$\boxed{x=2 \text{ corresponds to } y=8,\ y=-3,\ \&\ -3\neq 8.}$

Algebraic Reason why it's not a function.

$y = 3 \pm \sqrt{25 - (x-2)^2}$

$y = 3 + \sqrt{25 - (x-2)^2}$ is the top half of the circle



$y = 3 - \sqrt{25 - (x-2)^2}$ is the bottom half.

$Y_1 = 3 + \sqrt{}(25 - (x-2)^2)$ will give you the top half on a grapher.

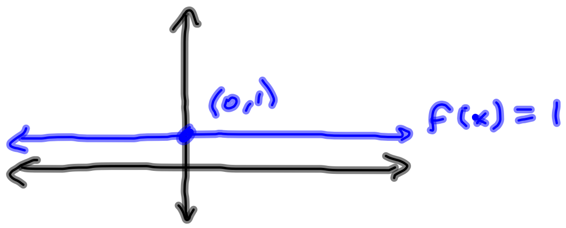
$f(x) = \sqrt{1 - x^2}$ Top half of a circle!

$y = \sqrt{1 - x^2}$

$y^2 = 1 - x^2$

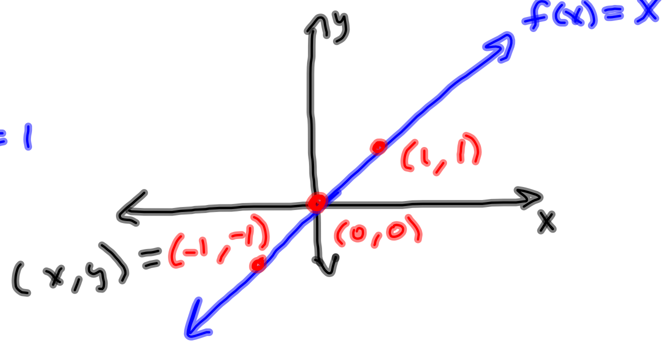
$x^2 + y^2 = 1$

$f(x) = 1$



Identity

$f(x) = x$



Our goal is to see

$f(x) = 3x - 7$

OR

$f(x) = 2(x+5) - 11$

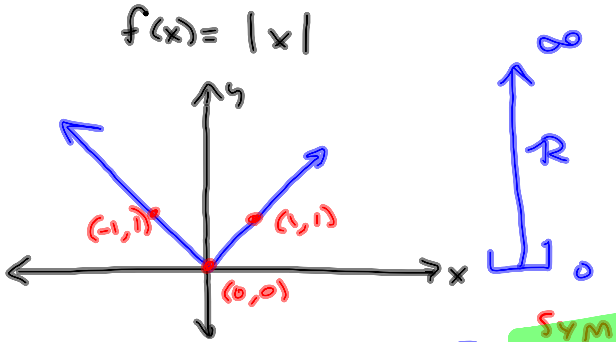
as variations on the $f(x) = X$ theme.

Down the road!

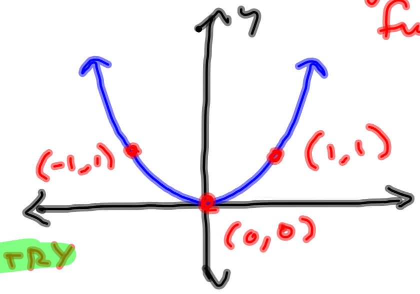
See $2(x-5)^2 + 4$ as a variation on $f(x) = x^2$

First, we need to KNOW the basic functions.

$f(x) = |x|$



$f(x) = x^2$ Square function



$\mathcal{D} = \{x \mid f(x) \text{ is legal}\}$
= Domain
$= \mathbb{R} = (-\infty, \infty) =$
$= \{x \mid x \text{ is real}\}$

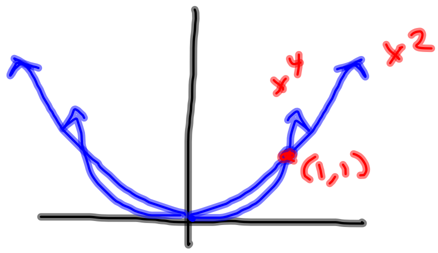
$\mathcal{R} = \{y \mid y = f(x) \text{ for some } x \in \mathcal{D}\}$
= Range $= [0, \infty)$

SYMMETRY ABOUT THE Y-AXIS
$f(-x) = f(x)$
$\boxed{\text{EVEN}}$

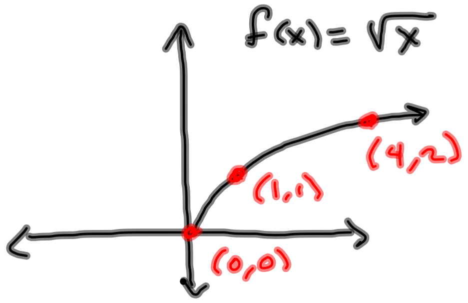
$\mathcal{D}, \mathcal{R}$ same as $f(x) = |x|$.
x^2 is real, when x is.

$x^4, x^6, x^8, x^{10}, \ldots$
all have pretty much the same shape/graph.

For $-1 < x < 1$, x^4 is below x^2. outside that domain, $x^4 \geq x^2$



$f(x) = \sqrt{x}$



$\mathcal{D} = [0, \infty) = \{x \mid x \geq 0\}$

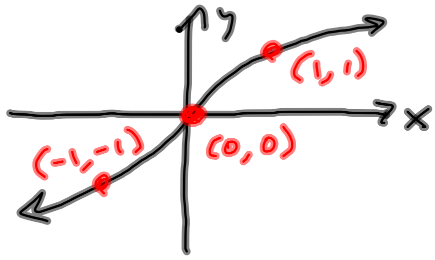
$\mathcal{R} = [0, \infty) = \{y \mid y \geq 0\}$

Same picture for

$f(x) = \sqrt[4]{x}, \sqrt[6]{x}, \sqrt[8]{x}, \dots$

$x^{\frac{1}{4}}, x^{\frac{1}{6}}, x^{\frac{1}{8}}, \dots$

$f(x) = \sqrt[3]{x}$



$\mathcal{D} = \mathbb{R}$

$\mathcal{R} = \mathbb{R}$

It's symmetric through/about the origin

It's ODD.

$f(-x) = \sqrt[3]{-x} = \sqrt[3]{(-1)x}$

$= \sqrt[3]{-1}\,\sqrt[3]{x} = -1\,\sqrt[3]{x}$

$= -\sqrt[3]{x} = -f(x).$

§2.3 Homework will be available @ 2pm
§2.1 is due Wed., 7:45 am
§2.2 " " Fri., 7:45

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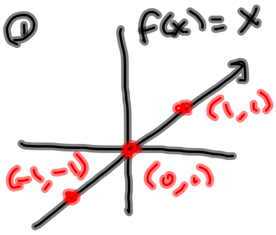
① $f(x) = x$

we graph $g(x)$ by transforming $f(x) = x$

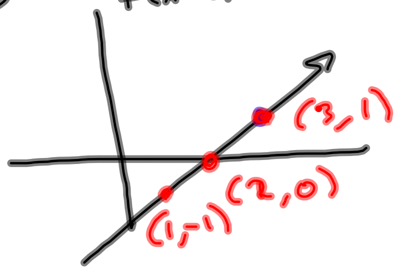
$g(x) = 3(x-2) + 5$
$= 3x - 6 + 5$
$= 3x - 1$

1. HORIZONTAL SHIFT ① $f(x-2) = x-2$ RIGHT 2
2. HORIZONTAL REFLECTION None
3. VERTICAL STRETCH ③ $3f(x-2) = 3(x-2)$ stretch by factor of 3.
4. VERTICAL SHIFT. ④ $3f(x-2) + 5$

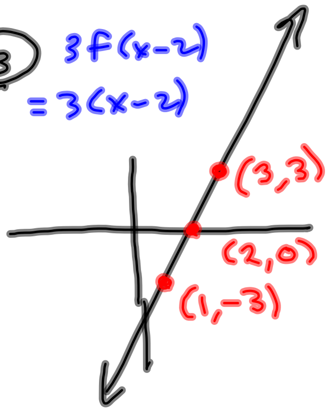
① $f(x) = x$



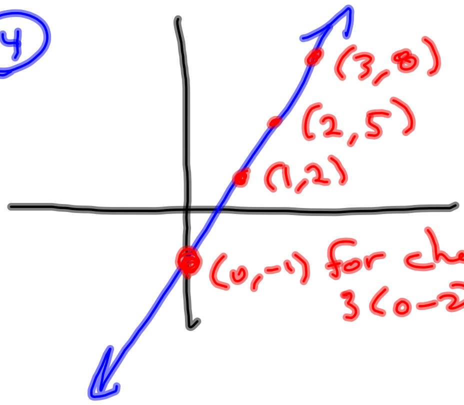
② $f(x-2) = x-2$



③ $3f(x-2) = 3(x-2)$



④



$3f(x-2) + 5$
$= 3(x-2) + 5$

(0,-1) for checkage.
$3(0-2) + 5 = -6 + 5 = -1$ ✓