Domain + Range of functions

Domain: all possible x values

Range: all possible y values

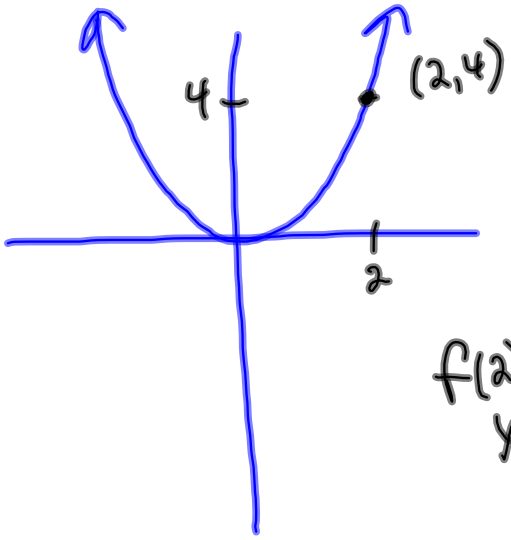
(x, y) $y = f(x)$

$f(x) = x^2$

$y = x^2$

D: $\mathbb{R}$

R: $\{y : y \geq 0\}$



$f(2) = 4$

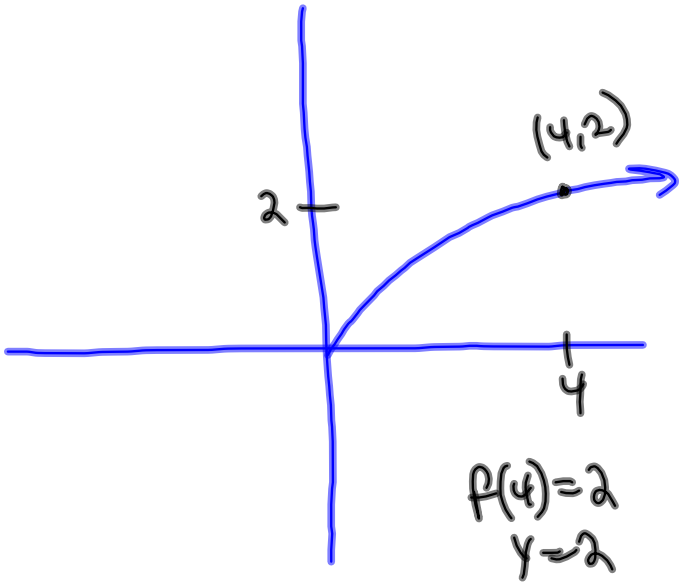
$y = 4$

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

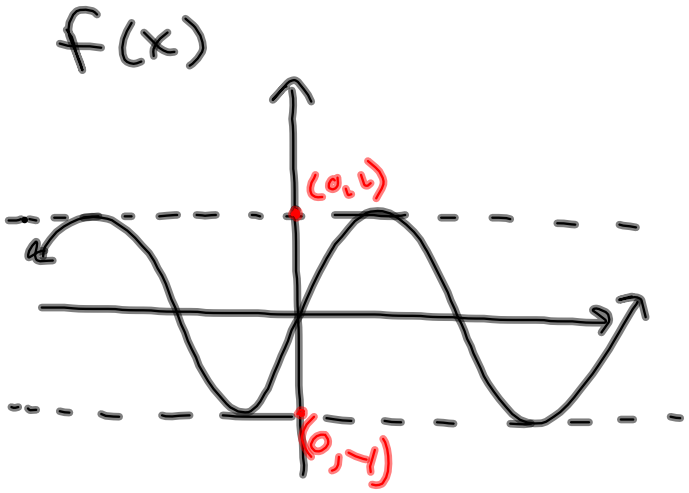
$y = \sqrt{x}$

D: $\{x : x \geq 0\}$

R: $\{x : x \geq 0\}$



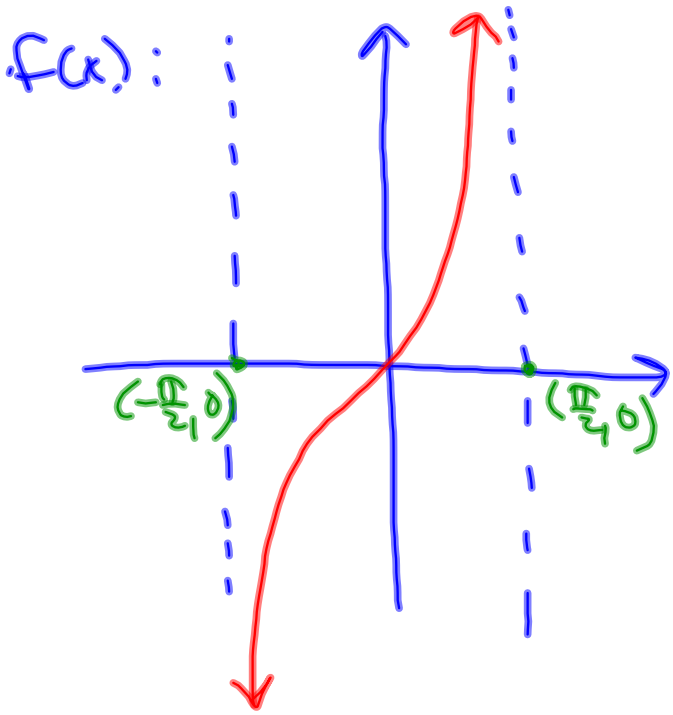
Jul 7-9:19 AM



Domain: $\mathbb{R}$

Range: $\{y : -1 \leq y \leq 1\}$

$y = \sin x$



D: $\{x: -\frac{\pi}{2} < x < \frac{\pi}{2}\}$

R: $\mathbb{R}$

Jul 25-10:27 AM

arithmetic mean ≡ average

a.m. of

$6, 4, 8 = \frac{18}{3} = 6$

distance = rate (speed) * time

look for = distance or = time

$d = rt \quad r = \frac{d}{t} \quad t = \frac{d}{r}$

mean - average
median - "middle value"
mode - value that appears most often

18
3
18
22
6
21
7
19

mean = 14.25
mode = 18

3
6
7
18
18
19
21
22

median = 18

Ratio

of boys to girls at camp is

3:1 (three to one) $\frac{3}{1}$ 3 to 1

126 boys, girls? $\frac{126}{g} = \frac{3}{1} \Rightarrow 126 = 3g$

42 girls

Proportion: Ratio = Ratio

factoring - common factors

$3x^2 + 6x$

$3 \cdot x \cdot x + 3 \cdot 2 \cdot x$

$3x(x+2)$

FOIL

$(x+2)(x+3)$

$x^2+3x+2x+6$

x^2+5x+6

$(2x-3)(x+2)$

$2x^2+4x-3x-6$

$2x^2+x-6$

$(a+b)^2 = (a+b)(a+b)$

NOT a^2+b^2

$(x+6)^2 = (x+6)(x+6) = x^2+6x+6x+36$

$x^2+12x+36 \neq x^2+6^2$

factoring - trinomials (UN-FOIL)

(x^2+5x+6) ← factors of 6 that add to 5

$(x+3)(x+2)$

(x^2-3x+1) ← factors of 1 that add to 3?

$(\ \ )(\ \ )$

(x^2+6x+5) factors of 5 that add to 6

$(x+1)(x+5)$

(x^2+x-6) factors of 6 whose difference is 1

$(x-2)(x+3)$

$(2x^2+x-6)$

$(2x+3)(x-2)$

$-4x$

$+3x$

$-x$

$(2x-3)(x+2)$ ✓

$4x$

$-3x$

x

6	1
1	6
2	3
3	2

$3x^2+5x+12$

$(3x\quad)(x\quad)$

$(3x+\quad)(x+\quad)$

$(3x+4)(x+3)$ ✗

$9x$

$4x$

$13x$

$(3x+8)(x+2)$ ✗

$8 \cdot 2 = 16$

$6 \cdot 2 = 12$

1	12	12	1
2	6	6	2
4	3	3	4

$(3x+12)(x+1)$ ✗

Prime

$5x^2+31x-28$

$(5x-7)(x+4)$ ×

$(5x-4)(x+7)$ ✓

$35x$

$-4x$

$31x$

squares, cubes, powers of 2

$2^0 = 1$
$2^1 = 2$
$2^2 = 4$
$2^3 = 8$
$2^4 = 16$
$2^5 = 32$
$2^6 = 64$
$2^7 = 128$
$2^8 = 256$
$2^9 = 512$
$2^{10} = 1024$

squares, cubes (and roots)

$\sqrt{4} = 2$

↑

Principle square root (+)

$x^2 = 4$

$\sqrt{x^2} = \sqrt{4}$

$x = \pm 2$

$\sqrt{24} = \sqrt{2 \cdot 12} = \sqrt{2 \cdot 2 \cdot 6} = \sqrt{2 \cdot 2 \cdot 2 \cdot 3}$

$\sqrt{4}\sqrt{6}$

$2\sqrt{6}$

$\sqrt{4} = \sqrt{2 \cdot 2} = \sqrt{2}\sqrt{2} = 2$

$\sqrt{48} =$

$\sqrt{16}\sqrt{3} =$

$4\sqrt{3}$

48

$4 \cdot 12$

$4 \cdot 3$

$4^3 = 64$

$3^3 = 27$

$2^4 \neq 8$

$2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$

$\sqrt[3]{8} = 2$

$\sqrt[3]{-8} = -2$

Jul 7-9:59 AM

exponents

$$x^{-3} = \frac{1}{x^3}$$

$$\frac{x^3 y^{-2}}{x^{-1} y^3} = \frac{x^3 x}{y^2 y^3} = \frac{x^4}{y^5}$$

$$x^{3-(-1)} y^{-2-3} = x^4 y^{-5} = \frac{x^4}{y^5}$$

$$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

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

$= \sqrt{x^3} = (\sqrt{x})^3$

$(16)^{3/2} = (\sqrt{16})^3 = 4^3 = 64$

$(16)^{3/2} = (16^3)^{\frac{1}{2}} = (4096)^{1/2} = \sqrt{4096} = 64$

$(x^{\frac{3}{2}})(x^{\frac{4}{3}}) = x^{\frac{3}{2}+\frac{4}{3}} = x^{\frac{17}{6}}$

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

$(5^{\frac{3}{2}})(5^{\frac{1}{2}}) = 25$

$$\left(\frac{1}{3}\right)^{-3} = 3^{3} = 27$$

$$\frac{1^{-3}}{3^{-3}} \quad \frac{3^{3}}{1^{3}} = 3^{3}$$

$$\left(\frac{2}{5}\right)^{-2} = \left(\frac{5}{2}\right)^{2} = \frac{25}{4}$$