MTH-PC College Algebra Session 19 11/14

$f(x) = x^2 + 2x$

Average Rate = slope

Average Rate

$x_1 = 1$ $x_2 = 4$

$y = f(x)$

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

$$\frac{f(4) - f(1)}{4 - 1}$$

$$f(4) \quad \frac{(4)^2 + 2(4) - \left((1)^2 + 2(1)\right)}{4 - 1}$$

$$\frac{16 + 8 - (1 + 2)}{3} = \frac{24 - 3}{3} = \frac{21}{3} = 7$$

$f(x) = x^2 + 2x$

difference quotient

$$\frac{f(x+h) - f(x)}{h}$$

$$\frac{(x+h)^2 + 2(x+h) - (x^2 + 2x)}{h}$$

$(x+h)^2 = (x+h)(x+h)$

FOIL $x^2 + xh + xh + h^2$

$x^2 + 2xh + h^2$

$$\frac{x^2 + 2xh + h^2 + 2x + 2h - x^2 - 2x}{h}$$

$$\frac{2xh + h^2 + 2h}{h} = 2x + h + 2$$

$f(x) = x^2 + 2x$

$x^{2-1} + 2x^{1-1}$

$2x + 2$ (+3)

$f(x) = 3x + x^2$ (5, 5, 5, 2)

$x_1 = 2$ (2) $\quad x_2 = 5$

Average Rate of Change

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

$$\frac{f(5) - f(2)}{5 - 2}$$

$$\frac{\overbrace{3(5) + (5)^2}^{f(5)} - \left(3(2) + (2)^2\right)}{5 - 2}$$

$$\frac{15 + 25 - (6 + 4)}{3}$$

$$\frac{40 - 10}{3} = \frac{30}{3} = \boxed{10}$$

$f(x) = 3x + x^2$ Difference Quotient

$$\frac{f(x+h) - f(x)}{h}$$

$$\frac{3(x+h) + (x+h)^2 - (3x + x^2)}{h}$$

$$\frac{3x + 3h + x^2 + h^2 + 2xh - 3x - x^2}{h}$$

$$\frac{h}{h}$$

$3 + h + 2x$

optional

$3x + x^{1+1}$

$3 + 2x$

$f(x) = \frac{2}{x}$

$$\frac{f(x+h) - f(x)}{h}$$

$$\frac{\frac{2}{x+h} - \frac{2}{x}}{h}$$

$$\frac{\frac{2}{(x+h)x}\,x - \frac{2}{x(x+h)}}{h}$$

$$\frac{\frac{2}{(x+h)x} - \frac{2}{x(x+h)}}{h}$$

$$\frac{\frac{2x}{x(x+h)} - \frac{2x+2h}{x(x+h)}}{h} = \frac{\frac{2x-2x-2h}{x(x+h)}}{h}$$

$$\frac{\frac{-2h}{x(x+h)}}{h} \Big\} \frac{-2h}{x(x+h)} \div \frac{h}{1}$$

Keep, change, Flip

$$\frac{-2h}{x(x+h)} * \frac{1}{h}$$

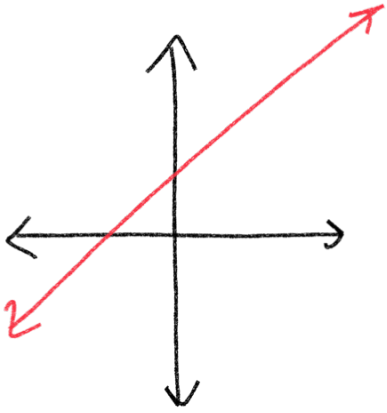
$$\frac{2}{x}$$

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

$$-2x^{-2}$$

$$\frac{-2}{x^2}$$

$$\frac{-2}{x(x+h)} = \boxed{\frac{-2}{x^2+hx}}$$



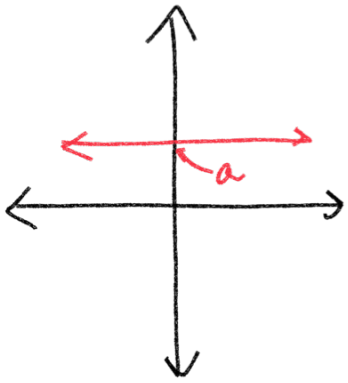
Function: $y = mx + b$

Name: Linear

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

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

Even / odd / neither



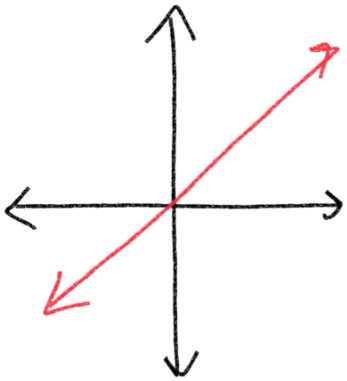
Function: $f(x) = a$

Name: Constant

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

Range: a

Even / odd / neither



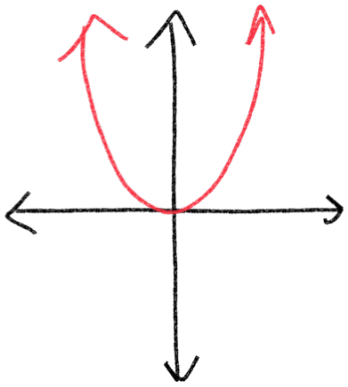
Function: $y = x$ $f(x) = x$

Name: Identity

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

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

Even / odd / neither



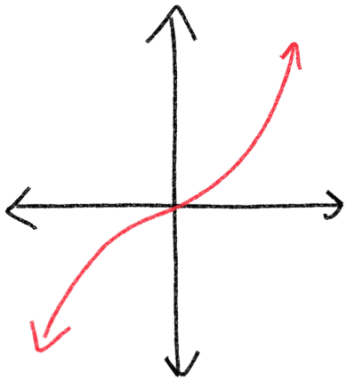
Function: $f(x) = x^2$

Name: Square

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

Even / odd / neither



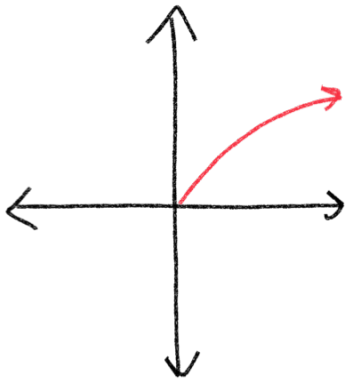
Function: $f(x) = x^3$

Name: Cube

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

Even / odd / neither



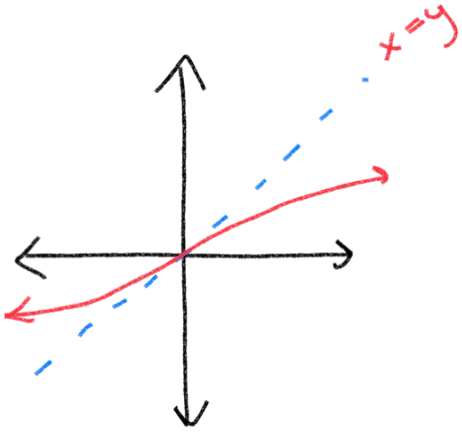
Function: $f(x) = \sqrt{x}$

Name: Square Root

Domain: $[0, \infty)$

Range: $[0, \infty)$

Even / odd / neither



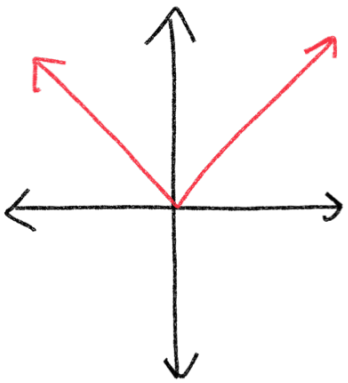
Function: $f(x) = \sqrt[3]{x}$

Name: Cube Root

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

Even / (odd) / neither



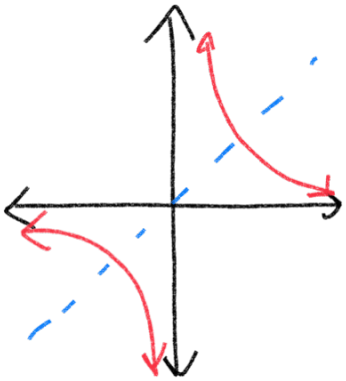
Function: $f(x) = |x|$

Name: Absolute value

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

(Even) / odd / neither



Function: $f(x) = \frac{1}{x}$

Name: Inverse (Reciprocal)

Domain: $x \neq 0$ $(-\infty, 0) \cup (0, \infty)$

Range: $y \neq 0$ $(-\infty, 0) \cup (0, \infty)$

Even / (odd) / neither