MTH-PC College Algebra Session 18 11/9

Even function $f(-x) = f(x)$

$f(-3) = f(3)$

symmetry about y-axis

Odd Functions

$f(-x) = -f(x)$

$f(-3) = -f(3)$

symmetry about $y = x$

Determine whether the function is even, odd, or mixed → neither.

1.) $x^8 + x^6 + 6x^0$ shift up 6

even even even

$\boxed{\text{even}}$

2.) $x^7 + x^3 + x^1$

odd

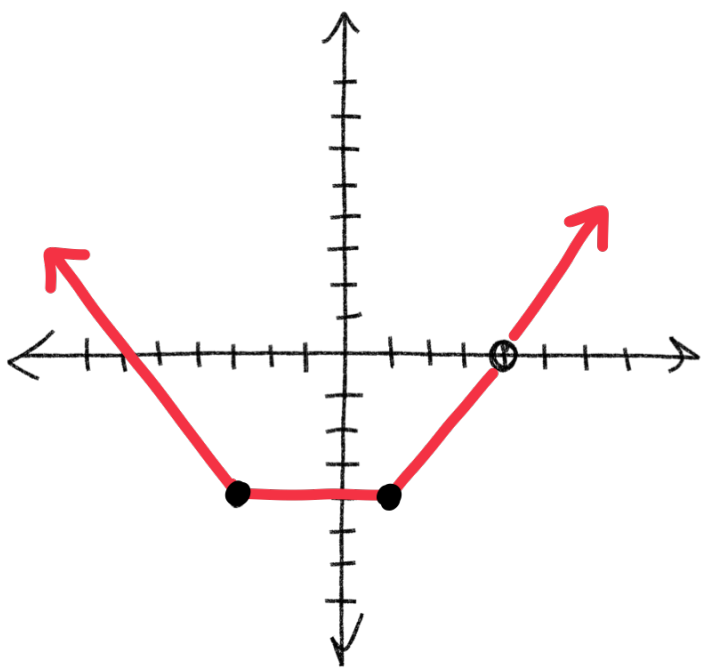
3.) $x^6 + x^3 + 2$

even odd even

neither

4.) $2x^2 + 3x - 8$

neither



$x \neq 4$

Domain: $(-\infty, 4) \cup (4, \infty)$

Range: $[-4, \infty)$

Increasing: $(1, \infty)$

Decreasing: $(-\infty, -3)$

Constant: $(-3, 1)$

Average Rate of Change $\longrightarrow$ slope

$f(x) = 2x$

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

Average Rate of change

from $\underline{f(1)}$ to $\underline{f(3)}$

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

$y \rightarrow f(x)$

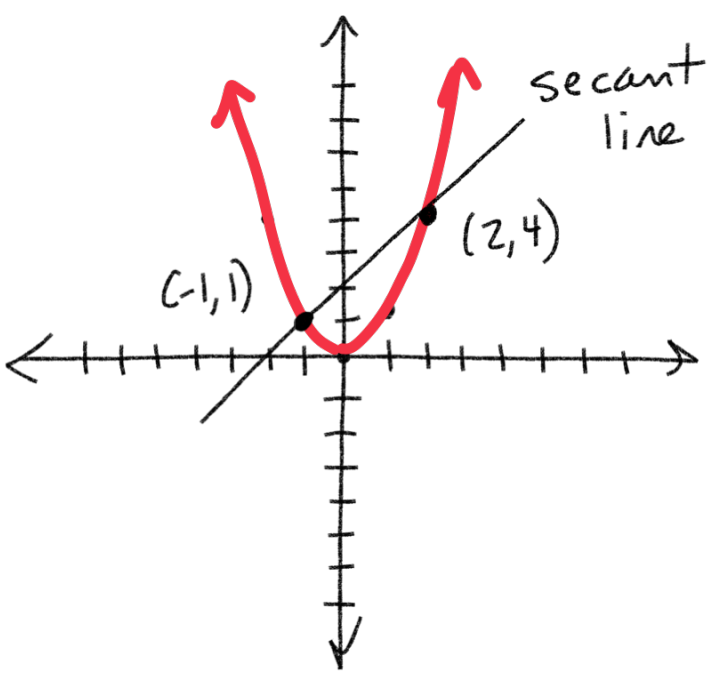
$$\frac{f(3) - f(1)}{3 - 1}$$

$$\frac{2(3) - 2(1)}{3 - 1} = \frac{6 - 2}{2} = \frac{4}{2} = \boxed{2}$$

$f(x) = x^2$

Average Rate of Change

$f(-1) \longrightarrow f(2)$



$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 1}{2 - (-1)}$$

$$\frac{4 - 1}{2 + 1} = \frac{3}{3} = \boxed{1}$$

$$\boxed{\frac{f(2) - f(-1)}{2 - (-1)} =}$$

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

$2 + 1$

$\boxed{1}$

$f(x) = x^2 + 4$

Average Rate of Change

$x_1 = -2$ $\boxed{x_2 = 4}$

$f(x) = x^2 + 4$

$f(4) = (4)^2 + 4 = 16 + 4 = 20$

$f(-2) = (-2)^2 + 4 = 4 + 4 = 8$

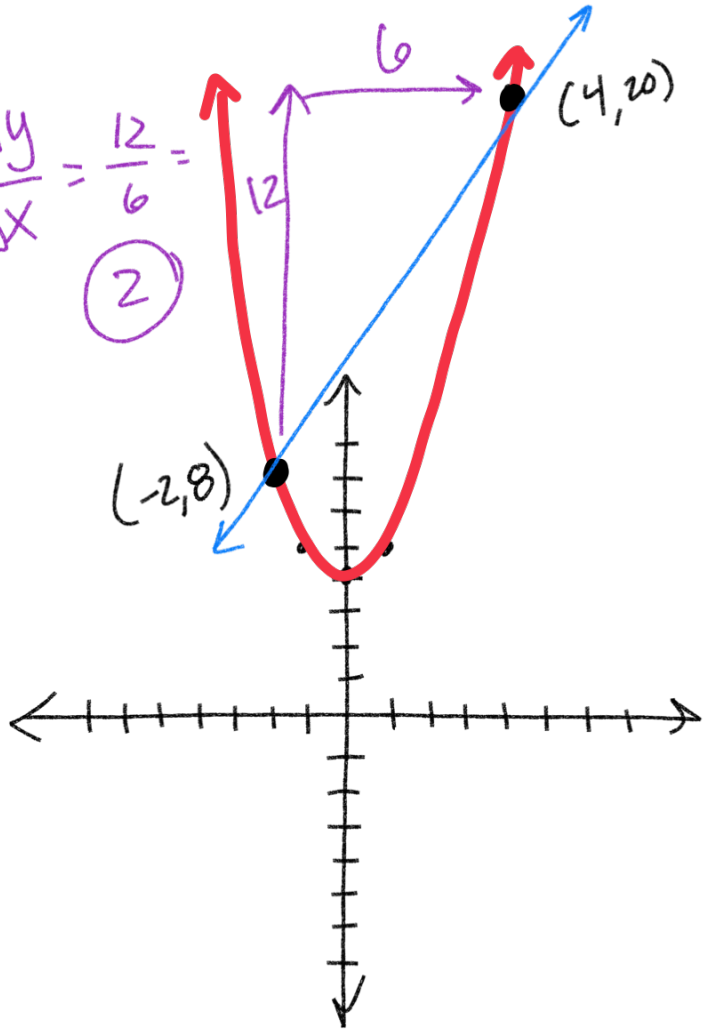
$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

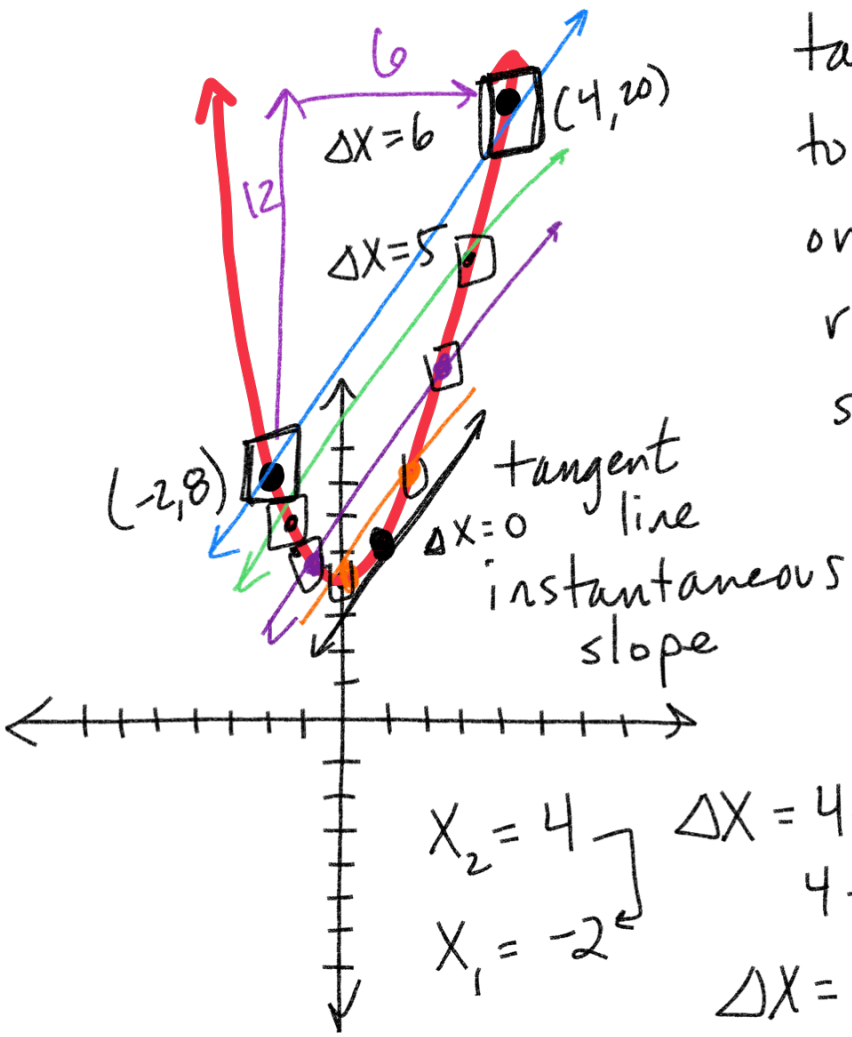
$$\frac{f(4) - f(-2)}{4 - (-2)}$$

$$\frac{[(4)^2 + 4] - [(-2)^2 + 4]}{4 + 2}$$

$$\frac{20 - 8}{4 + 2} = \frac{12}{6} = 2$$

$$\frac{\Delta y}{\Delta x} = \frac{12}{6} = 2$$





tangent line - line that touches the graph in only one place. Its slope represents the instantaneous slope at that point

Average Rate of Change

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

$X_2 = 4$

$X_1 = -2$

$\Delta X = 4-(-2)$

$4+2$

$\Delta X = 6$

$$\frac{f(x_2)-f(x_1)}{-2-(-2)}$$

$$\cancel{\frac{f(x_2)-f(x_1)}{0}}$$

$X_1 = -2$

$X_2 = -2 + \Delta X$

$-2 + 6$

$X_2 = x+h$

$X_1 = x$

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

Difference Quotient

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

$f(x) = x^2 + 4$

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

$f(\boxed{x+h}) = (x+h)^2 + 4$

$$\frac{(x+h)^2 + 4 - (x^2 + 4)}{h}$$

IF $f(x) = 3x$

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

$$\frac{(x+h)(x+h) + 4 - x^2 - 4}{h}$$

$$\frac{\boxed{\cancel{x^2}} + hx + hx + h^2 \boxed{\cancel{+4}} \boxed{\cancel{-x^2}} \boxed{\cancel{-4}}}{h}$$

$x^{2-1} + \cancel{4}^{\,0}$

$$\frac{hx + hx + h^2}{h} = \frac{2\cancel{h}x + h^{\cancel{2}}}{\cancel{h}}$$

$2x^1 = 2x$

$\boxed{2x + h}$ $h = 0$

instantaneous slope $= 2x$

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

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

Average Rate of change

$x+h$ $x+h$

Difference Quotient

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

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

$(x+h)(x+h)$

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

$$\frac{2\cancel{h}x + h^{\cancel{2}} - \cancel{h}^{-1}}{\cancel{h}} = \boxed{2x - 1 + h}$$

$$x^{2-1} - x^{1-1} + \cancel{3}^{0} \qquad 3x^{0}$$

Derivative $\boxed{2x - 1}$