MTH-PC College Algebra Session 18 11/10

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

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

symmetry about y-axis

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

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

symmetry about $y = x$

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

1.) $x^8 + x^4 + 6x^0$

even

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

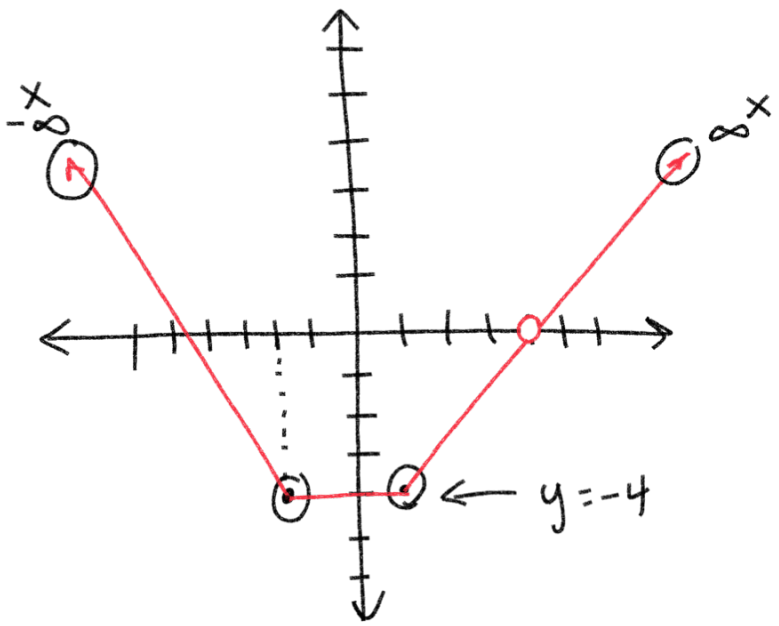
odd

3.) $x^{6\text{ even}} + x^{3\text{ odd}} + 2x^{0\text{ even}}$

neither

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

neither



Domain: $x \neq 4$ (x's) $(-\infty, 4) (4, \infty)$

Range: $[-4, \infty)$ (y's)

Increasing: $(1, \infty)$

Decreasing: $(-\infty, -2)$

Constant: $(-2, 1)$

Average Rate of Change → slope

$f(x) = 2x$

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

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

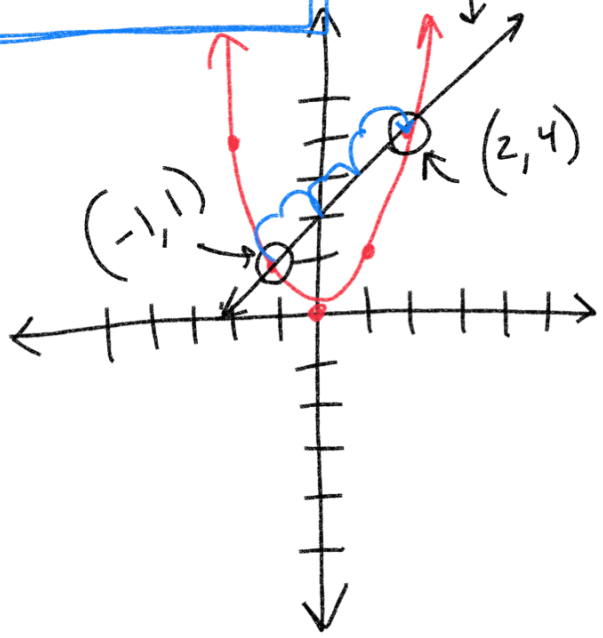
Av Rate of change from $f(1) \rightarrow f(3)$

$y = f(x)$

x_1 x_2

$$\frac{f(3) - f(1)}{3 - 1} \qquad \frac{2(3) - 2(1)}{3 - 1}$$

$f(x) = x^2$



$$\frac{6 - 2}{2} = \frac{4}{2} = 2$$

Average Rate of Change

$f(-1)$ and $f(2)$

slope $-1 \rightarrow 2$

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(2) - f(-1)}{2 - (-1)}$$

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

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

Average rate of change

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

$x_1 = -2$ $\quad$ $x_2 = 4$

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

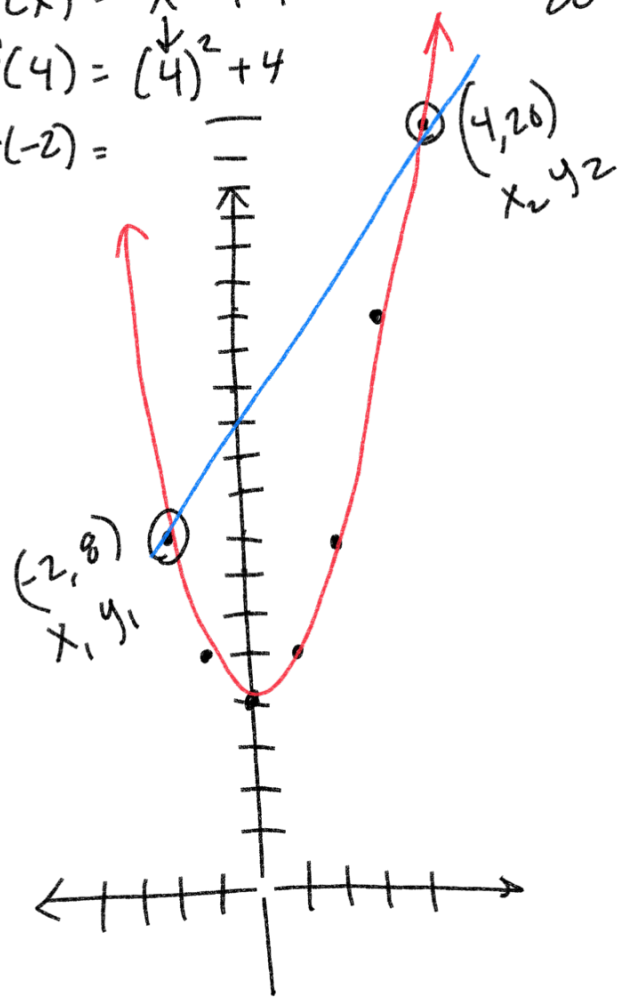
$f(4) = (4)^2 + 4$ $\quad \downarrow 20$

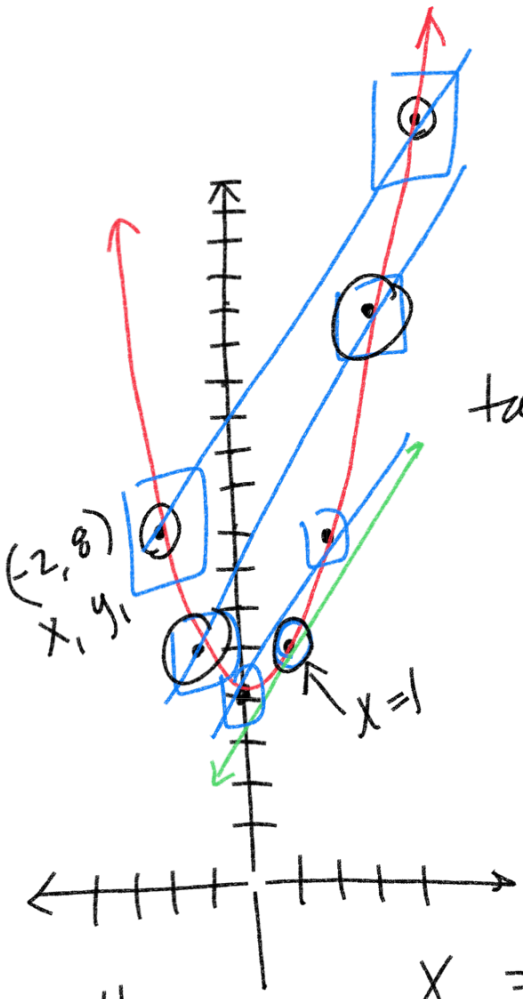
$f(-2) = \quad \downarrow 8$

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

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

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





tangent → line that touches the graph in only one place and represents the instaneous slope of the line at that point.

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

$x_2 = x_1 + h$

$x_2 = 4$ → h

$x_1 = -2$ → $x_1 + 6$

$x_2 = x_1 + h$

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

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

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

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

$x^2 + hx + hx + h^2$

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

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

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

Difference Quotient
slope of tangent line

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

↓ derivative

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

$h=0$

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

derivative $2x$

$x=1$ $\quad 2x+h$

$2(1) = 2$