Algebra 3

Chapter 2.1-2.5 Review

Name: K.H.

Date: __________ Per. ______

Non-Calculator Section

Determine whether each relation represents a function. For each function, state the domain and the range.

1. $\{(-1,0),(2,3),(4,0)\}$

Domain: $\{x \mid x = -1, 2, 4\}$

Range: $\{y \mid y = 0, 3\}$

2. $\{(4,-3),(2,1),(4,2)\}$ Not a function!

3. $f(x) = \dfrac{3x}{x^2 - 1}$ Calculate each value for the given function.

a. *f(2)* 2

b. *f(-2)* -2

c. *f(-x)* $\dfrac{-3x}{x^2-1}$

d. *–f(x)* $\dfrac{-3x}{x^2-1}$

$(x-2)(x-2)$
x^2-4x+4

e. *f(x-2)* $\dfrac{3x-6}{x^2-4x+3}$

f. *f(2x)* $\dfrac{6x}{4x^2-1}$

4. $f(x) = \sqrt{x^2 - 4}$ Calculate each value for the given function.

a. *f(2)* 0

b. *f(-2)* 0

c. *f(-x)* $\sqrt{x^2-4}$

d. *–f(x)* $-\sqrt{x^2-4}$

e. *f(x-2)* $\sqrt{x^2-4x}$

f. *f(2x)* $\sqrt{4x^2-4} = 2\sqrt{x^2-1}$

5. Find the domain of each function.

a. $f(x) = \dfrac{3x^2}{x-2}$ $\{x \mid x \neq 2\}$

b. $f(x) = \sqrt{2-x}$ $\{x \mid x \leq 2\}$

c. $f(x) = \dfrac{\sqrt{x}}{|x|}$ $\{x \mid x > 0\}$

d. $f(x) = \dfrac{1}{x^2 - 3x - 4}$ $\{x \mid x \neq 4 \text{ or } -1\}$

$(x-4)(x+1)$

6. *f(x)* = 2-x; $g(x)$ = 3x + 1 Find each sum, difference, product or quotient. State the domain of each.

a. $f+g$

$2x+3$

$\{x \mid \mathbb{R}\}$

b. $f-g$

$-4x+1$

$\{x \mid \mathbb{R}\}$

c. $f \cdot g$

$(2-x)(3x+1)$

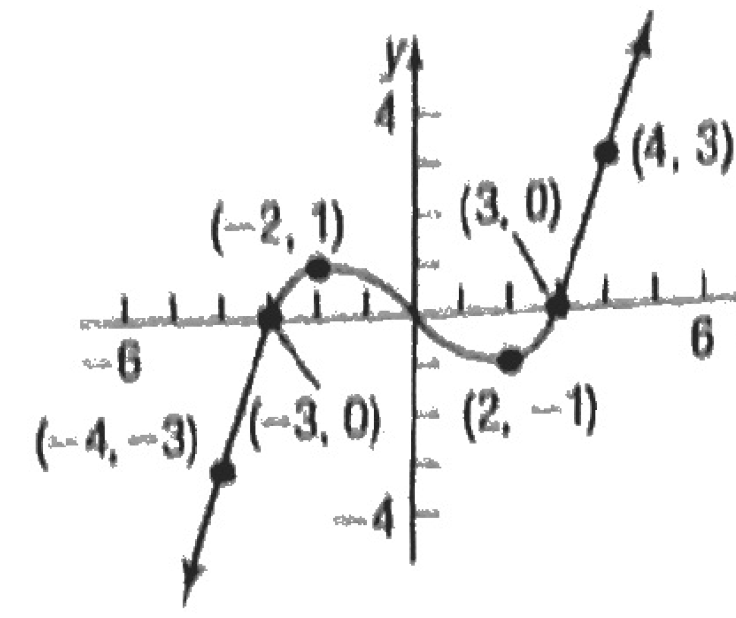
$-3x^2+5x+2$

$\{x \mid \mathbb{R}\}$

d. $\dfrac{f}{g} = \dfrac{2-x}{3x+1}$

$\{x \mid x \neq -\frac{1}{3}\}$

7. Use the graph of the function f to find:



a. The domain and range of f. Domain: $\{x \mid \mathbb{R}\}$

Range: $\{y \mid \mathbb{R}$

b. The intervals on which f is increasing, decreasing, or constant.

Inc. $= (-\infty, -2), (2, \infty)$ Dec. $= (-2, 2)$

c. The local minima and local maxima.

(2, −1) (−2, 1)

d. Whether the graph is symmetric with respect to the x-axis, the y-axis, or the origin.

Symm. w/ Origin

e. Whether the function is even odd, or neither.

Odd

f. The intercepts, if any.

$(-3, 0)$ $(0, 0)$ + $(3, 0)$

8. Determine (*algebraically*) whether the function is even, odd, or neither.

a. $g(x) = 1 - x + x^3$

$g(-x) = 1 - (-x) + (-x)^3$ $\boxed{\text{Neither}}$

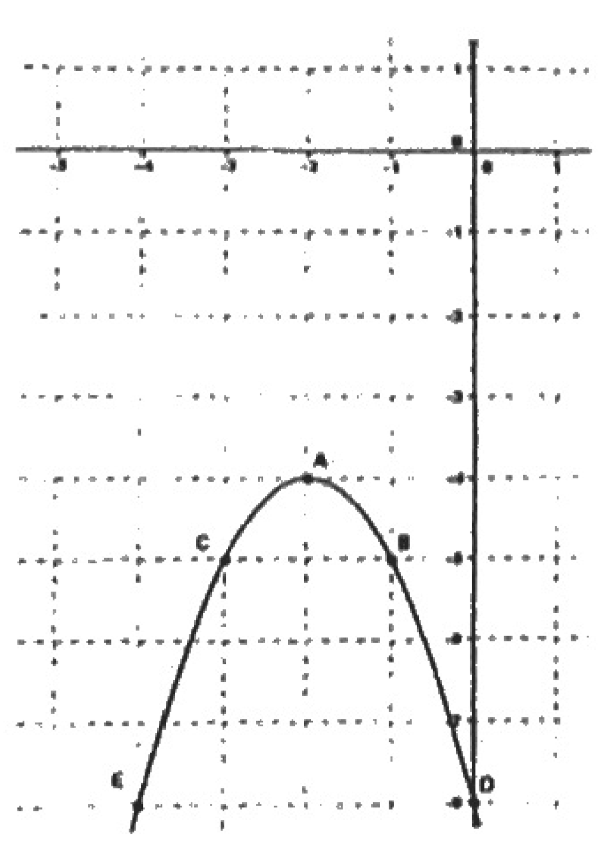
$= 1 + x - x^3$

b. $f(x) = \sqrt{1 - x^3}$ $f(-x) = \sqrt{1 - (-x)^3}$

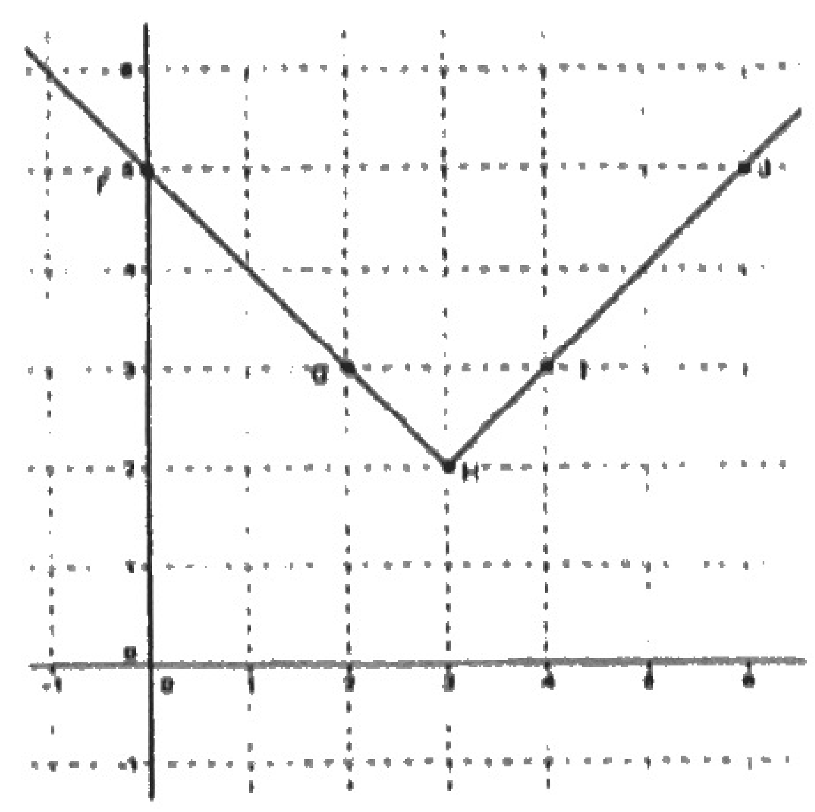
$= \sqrt{1 + x^3}$ Neither

9. Write the equation that best fits the given graph.

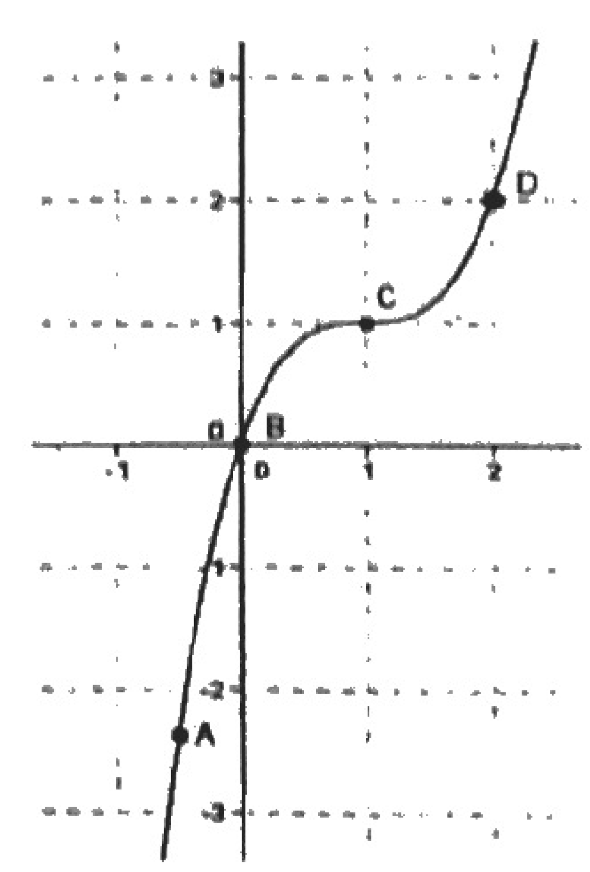
a. $f(x) = -(x+2)^2 - 4$



b. $f(x) = |x-3| + 2$



c. $f(x) = (x-1)^3 + 1$



10. *Describe* how each function has been transformed from its parent function.

a. $f(x) = (x-3)^2 + 1$

Shifted Right 3 + Up 1

b. $g(x) = |2x|$

Horizontal Compression by $\frac{1}{2}$

c. $h(x) = \dfrac{1}{x-3} - 1$ Shifted Right 3 + Down 1

d. $j(x) = \dfrac{1}{3}|x|$

Vertical Compression by $\frac{1}{3}$

e. $f(x) = (x+1)^3 - 2$

Shifted Left 1 + Down 2

Algebra 3 Name: KH

Chapter 2.1-2.5 Review

Date: ________ Per. ____

Calculator Allowed *Section*

11. Using a graphing utility, graph the function over the indicated interval. $f(x) = 2x^4 - 5x^3 + 2x + 1$ **(-2, 3)**

a. Approximate any local maxima and local minima.

Max: (0.414, 1.532)

Min: (1.798, -3.565) & (-0.336, 0.543)

b. Determine where the function is increasing and where it is decreasing.

Incr.: (-0.336, 0.414) & (1.798, ∞)

Decr.: (-∞, -0.336) & (0.414, 1.798)

12. a. Find the average rate of change from 2 to 3 on the function $f(x) = x^2 - 3x + 2$. $\frac{2-0}{3-2} = 2$

$f(2)=0 \quad f(3)=2$

b. Find the equation of the secant line through 2, $f(2)$ and 3, $f(3)$.

$y = 2x + b$

$0 = 2(2) + b$

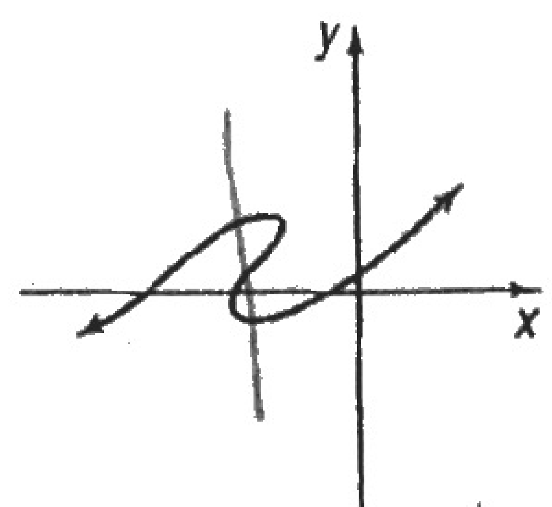
$0 = 4 + b$

$b = -4$

$\boxed{y = 2x - 4}$

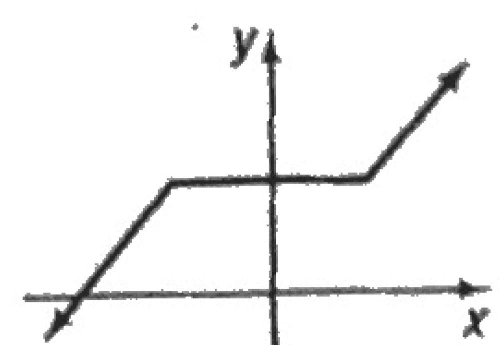
13. Is the graph shown the graph of a function? Explain your answer.

a.



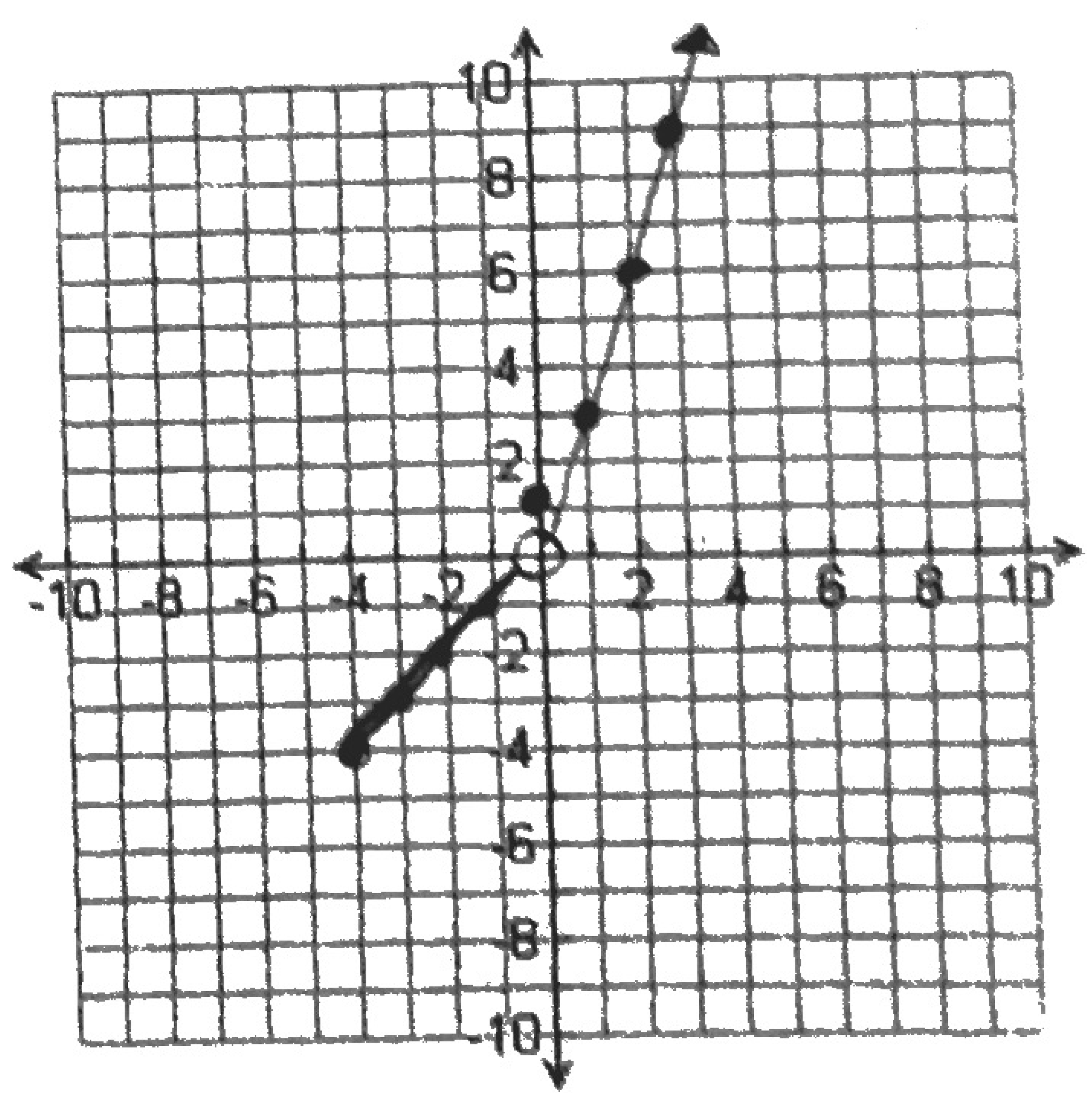
No; It does not pass the vertical line test.

b.



yes: No matter where a vertical line is drawn, the graph only once.

14. $f(x) = \begin{cases} x & \text{if } -4 \le x < 0 \\ 1 & \text{if } x = 0 \\ 3x & \text{if } x > 0 \end{cases}$



a. Find the domain of the $f(x)$. $\{x \mid x \ge -4\}$

b. Locate any intercepts.

(0, 1)

c. Graph the function.

d. Give the range.

$\{y \mid y \ge -4 \text{ \& } y \ne 0\}$

e. Is f continuous on its domain?

NO

3a) $f(x) = \dfrac{3x}{x^2-1}$

$f(2) = \dfrac{3(2)}{(2)^2-1} = \dfrac{6}{3} = \boxed{2}$

b) $\dfrac{3(-2)}{(-2)^2-1} = \dfrac{-6}{3} = \boxed{-2}$

c) $f(-x) = \dfrac{3(-x)}{(-x)^2-1} = \boxed{\dfrac{-3x}{x^2-1}}$

d) $-f(x) = -\left(\dfrac{3x}{x^2-1}\right) = \boxed{\dfrac{-3x}{x^2-1}}$

e) $f(x-2) = \dfrac{3(x-2)}{(x-2)^2-1} = \dfrac{3x-6}{x^2-4x+4-1} = \boxed{\dfrac{3x-6}{x^2-4x+3}}$

f) $f(2x) = \dfrac{3(2x)}{(2x)^2-1} = \boxed{\dfrac{6x}{4x^2-1}}$

4a) $f(2) = \sqrt{(2)^2-4}$

$= \sqrt{4-4}$

$= \sqrt{0} = \boxed{0}$

b) $f(-2) = \sqrt{(-2)^2-4}$

$= \sqrt{4-4}$

$= \sqrt{0} = \boxed{0}$

c) $f(-x) = \sqrt{(-x)^2-4}$

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

d) $f(2x) = \sqrt{(2x)^2-4}$

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

$= \sqrt{4} \cdot \sqrt{x^2-1}$

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

d) $-f(x) = \boxed{-\sqrt{x^2-4}}$

e) $f(x-2) = \sqrt{(x-2)^2-4} = \sqrt{x^2-4x+4-4} = \boxed{\sqrt{x^2-4x}}$

5a) $x-2 \neq 0$

$x \neq {}^-2$

$\{x \mid x \neq {}^-2\}$

b) $2-x \geq 0$

$-x \geq {}^-2$

$x \leq 2$

$\{x \mid x \leq 2\}$

c) $|x| \neq 0 \quad \cancel{x} \geq 0$

$x \neq 0$

$\{x \mid x > 0\}$

d) $x^2-3x-4 \neq 0$

$(x-4)(x+1) \neq 0$

$x-4 \neq 0 \quad x+1 \neq 0$

$x \neq 4 \quad x \neq {}^-1$

$\{x \mid x \neq 4 \text{ or } {}^-1\}$

6a) $2-x+3x+1$

$2x+3$

$\{x \mid \mathbb{R}\}$

b) $2-x-(3x+1)$

$2-x \cdot 3x-1$

$-4x+1$

$\{x \mid \mathbb{R}\}$

c) $(2-x)(3x+1)$

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

$-3x^2+5x+2$

$\{x \mid \mathbb{R}\}$

d) $\frac{2-x}{3x+1}$

$3x+1 \neq 0$

$3x \neq {}^-1$

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

$\{x \mid x \neq {}^-\frac{1}{3}\}$

8a) Even

$g(-x) = 1-(-x)+(-x)^3$

$= 1+x-x^3$

not same as original so not even...

odd

$= -(1-x+x^3)$

$= -1+x-x^3$

not same so not odd.... therefore its **neither**

8b) $f(x) = \sqrt{1-x^3}$

Even

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

$= \sqrt{1+x^3}$

not same as original so not even.

odd

$-(\sqrt{1-x^3})$

$-\sqrt{1-x^3}$

not same so not odd....... Therefore its **Neither!**

12a) $\dfrac{f(b)-f(a)}{b-a}$ $\quad a=2$, $b=3$ $\quad f(x)=x^2-3x+2$

$$\frac{f(3)-f(2)}{3-2} = \frac{(3^2-3(3)+2)-(2^2-3(2)+2)}{3-2} = \frac{2-0}{3-2} = \boxed{2}$$

m

b) .... through $2, f(2)$ and ....

x y

$$\boxed{y = \underline{2}\,x + \underline{-4}}$$

$y = mx+b$

$f(2) = 2(2)+b$

$0 = 4+b$

$b = -4$