MTH-PC College Algebra Session 23 12/4

Find the inverse.

1.) Switch $y \rightleftharpoons x$

2.) Solve for y

$y = x^2 + 3$

$x = y^2 + 3$

$-3 \quad -3$

$\sqrt{x-3} = \sqrt{y^2}$

$\boxed{y = \pm\sqrt{x-3}}$

inverse

$f(x) \to f^{-1}(x)$

$g(x) = x^3 - 8$ Find $g^{-1}(x)$

$y = x^3 - 8$

$x = y^3 - 8$

$+8 \quad +8$

$\sqrt[3]{x+8} = \sqrt[3]{y^3}$

$\boxed{y = \sqrt[3]{x+8}}$

Pre-Calculus Chapter 1 Practice Test

ordered pair

1.) (2.5 pts each, 5 pts total) Use the graph of y = g(x) to answer the following:

$(x, f(x))$

(x, y)

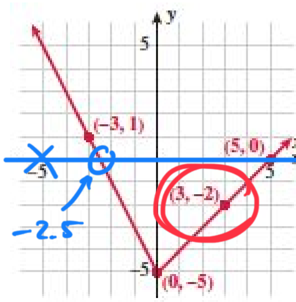
a) g(3)

what is y if $x = 3$

$y = -2$

$(3, -2)$

-2



$f(x) = 0$

$y = 0$

$(5, 0)$

-2.5

b) g(0)

$g(x) = 0$

$x = -2.5, 5$

2.) (5 pts each, 10 pts total) Evaluate the given quantities applying the following four functions:

$f(x) = 2x - 3$ $F(x) = 4 - x^2$ $g(x) = 5 + x$ $G(x) = x^2 + 2x - 7$

a) $G(-3) - F(-1)$

$G(x) = x^2 + 2x - 7$

$G(-3) = (-3)^2 + 2(-3) - 7$

$9 + (-6) - 7$

$3 - 7$

-4

$G(-3) = -4$

$F(x) = 4 - x^2$

$F(-1) = 4 - (-1)^2$

$4 - 1 = 3$

$F(-1) = 3$

$G(-3) - F(-1)$

$\downarrow$

$-4 - 3 = \boxed{-7}$

b) $\frac{f(-6)}{g(4)}$

3.) (5 pts) Find the domain of the given function. Express the domain in interval notation.

a) $g(x) = \frac{\sqrt{4x-8}}{2x}$

Restrictions: $\sqrt{}$ ← No negatives

and

$\frac{\square}{\square}$ ← denominator cannot be zero

$\sqrt{4x-8}$

$4x-8 \geq 0$

$+8 \quad +8$

$\frac{4x}{4} \geq \frac{8}{4}$

$x \geq 2$

$\frac{2x}{2} \neq \frac{0}{2}$

$x \neq 0$

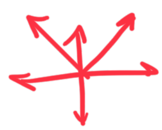
interval notation

$\boxed{[2, \infty) \quad x \geq 2}$

4.) (5 pts each, 10 pts total) Determine whether the function is even, odd, or neither.

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

odd even → neither

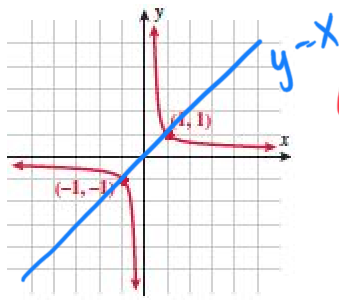


b) $g(x) = |x| + x^2$

even even → Even

5.) (5 pts each, 10 pts total) For each of the following graphs: Name the graph, define the domain and range, and determine whether it is even, odd, or neither.

a)



Name: Inverse/Reciprocal

(x) Domain: $x \neq 0$

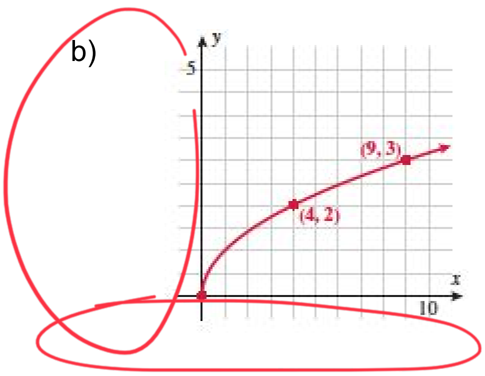
$(-\infty, 0) \cup (0, \infty)$

(y) Range: $y \neq 0$

$(-\infty, 0) \cup (0, \infty)$

Even/odd/Neither

b)



Name: Square Root

Domain: $[0, \infty)$

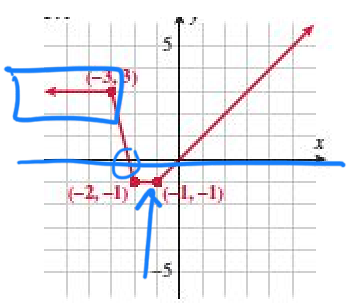
Range: $[0, \infty)$

Even/odd/Neither

6.) (5 pts) State the domain, range, and the x-intervals where the function is increasing, decreasing, or constant. Find where f(x) = 0.

Domain: $\mathbb{R}$

$(-\infty, \infty)$



Range: $[-1, \infty)$

slope +

Increasing: $(-1, \infty)$

slope −

Decreasing: $(-3, -2)$

slope = 0

Constant: $(-\infty, -3) \cup (-2, -1)$

$f(x) = 0$

$\boxed{x = 0, -2.3?}$

7.) (5 pts each, 10 pts total) Find the average rate of change for the function from:

$x = 1$ to $x = 3$.

x_1 x_2

Average Rate of Change

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

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

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

$$\frac{[4-(3)^2] - [4-(1)^2]}{2} = \frac{[4-9] - [4-1]}{2}$$

$$\frac{-5-3}{2} = \frac{-8}{2} = \boxed{-4}$$

b) $g(x) = \sqrt{x^2 - 1}$

8.) (5 pts each, 10 pts total) Find the difference quotient for the following functions:

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

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

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

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

FOIL

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

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

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

b) $g(x) = 5x - x^2$

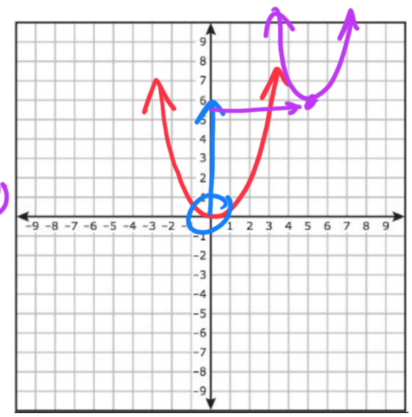
9.) (5 pts each, 10 pts total) Draw the parent function. Next, describe, in words, the transformation. Draw the function and include the vertex, if applicable.

a) $f(x) = (x - 5)^2 + 6$

Right 5

up 6

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



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

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

$f(x) = \left|\frac{3x}{3} - \frac{3}{3}\right| - 2$

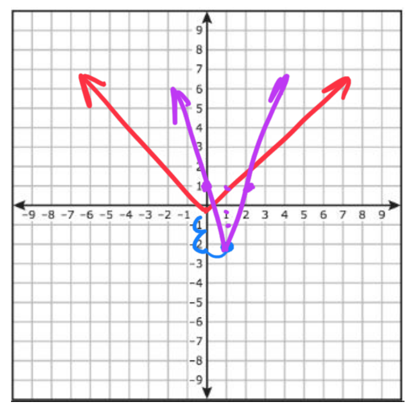
$f(x) = |3(x-1)| - 2$

slope

$\frac{\text{up } 3}{\text{over } 1}$

1 right

down 2



10.) (5 pts) Evaluate the functions for the specified values, if possible.

$$f(x) = 3x - 5 \qquad g(x) = x^2 + 2$$

a) $(f - g)(4)$

$f(4) - g(4)$

$[3(4)-5] - [(4)^2+2]$

$[12-5] - [16+2]$

$7 - 18 = \boxed{-11}$

$\cancel{(f-g)(4)}$

$\cancel{4f - 4g}$

11.) (5 pts each, 10 pts total) Evaluate the functions for the specified values, if possible.

$$f(x) = 3x - 5 \qquad g(x) = x^2 + 2$$

a) $f(g(x))$

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

$3x^2+6-5$

$\boxed{3x^2+1}$

b) $(g \circ f)(1) = g(f(1))$

open

closed → multiply

$f(1) = 3(1)-5$

$3-5=-2$

$g(-2) = (-2)^2+2$

$4+2=\boxed{6}$

12.) (5 pts each, 10 pts total) Find the inverse of each of the following functions.

a) $f(x) = \frac{x-2}{3}$

1.) switch $y \rightleftarrows x$

2.) Solve for y

$\downarrow$

$y = \frac{x-2}{3}$

$\downarrow$

$3x = \left(\frac{y-2}{3}\right)3$

$3x = y - 2$

$+2 \quad\quad +2$

$\boxed{y = 3x+2}$

b) $g(x) = x^2 + 6$

$\downarrow$

$y = x^2 + 6$

$x = y^2 + 6$

$-6 \quad\quad -6$

$\sqrt{x-6} = \sqrt{y^2}$

$\boxed{y = \pm\sqrt{x-6}}$