

Name: _____

Key

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Date: _____

Math 3 - Unit 1 Test Review

1) In which direction must the graph of $y = \frac{1}{x}$ be shifted to produce the graph of $\frac{1}{x+2} - 3$?

left 2, down 3

2) At which x-coordinate does $f(x) = -|x - 4| + 3$ have its maximum value?

$$x = 4$$

3) An inverse is what type of transformation?

reflection over the $y = x$ line

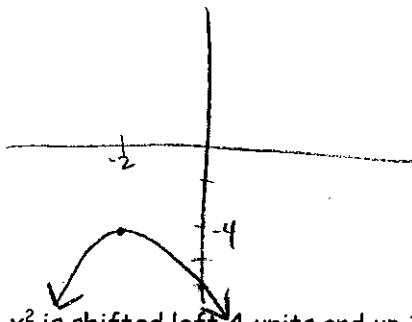
4) What is the inverse of $f(x) = \frac{x+6}{3}$?

$$x = \frac{y+6}{3}$$

$$3x = y + 6$$

$$3x - 6 = y^{-1}$$

5) Sketch the graph that best represents $y = -(x+2)^2 - 4$?



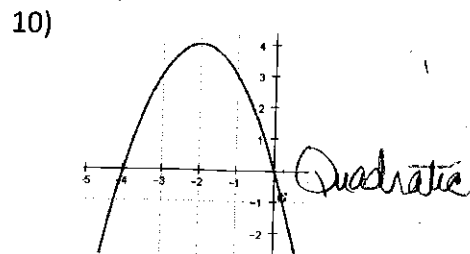
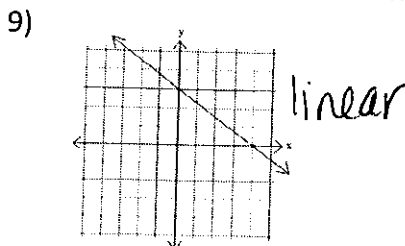
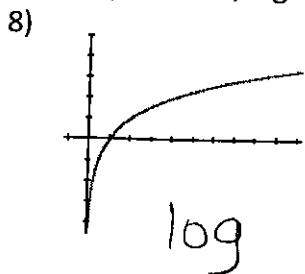
6) If the graph of $y = x^2$ is shifted left 4 units and up 2 units, what is the equation of the new graph?

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

7) What is the axis of symmetry for the graph $f(x) = x^2 - 2x^2 + 4$?

$$x = 0$$

(8 - 13) Match the equation type to each graph or table (linear, quadratic, cubic, quartic, rational, absolute value, exponential, logarithmic). Some may be used more than once or not at all.



11)

x	y
-1	16
0	2
1	-2
2	4
3	20
4	46

12)

x	y
0	2
1	4
2	8
3	16

$\times 2$
 $\times 2$
 $\times 2$

exponential

13)

x	y
-2	0
-1	9
0	18
1	27
2	36

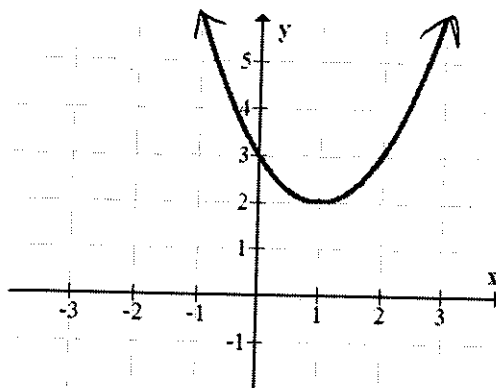
14) Given the function graphed to the right, state the domain and range of the graph and its inverse.

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

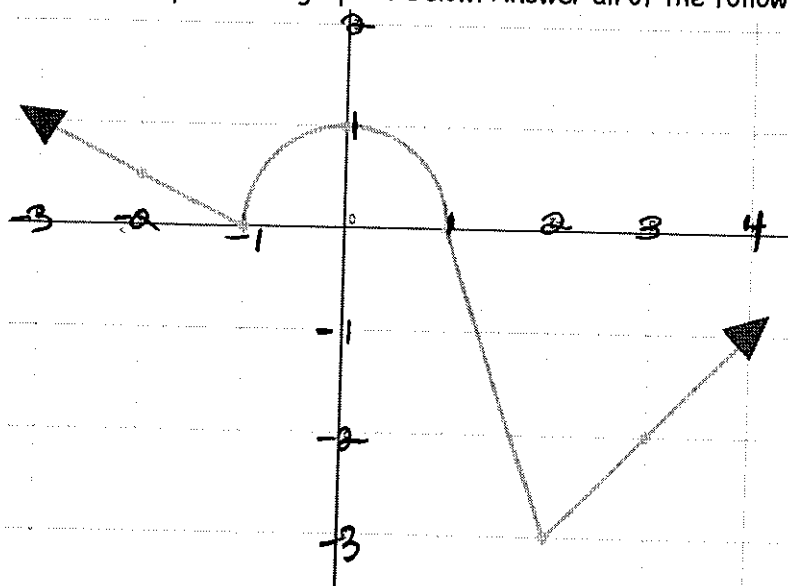
Inverse
Domain: $[2, \infty)$

Range: $[2, \infty)$

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



15) Given the piecewise graphed below. Answer all of the following questions.



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

range: $[-3, \infty)$

increasing: $(-1, 0) \cup (2, \infty)$

decreasing: $(-\infty, -1) \cup (0, 2)$

absolute max: N/A relative max: $(0, 1)$

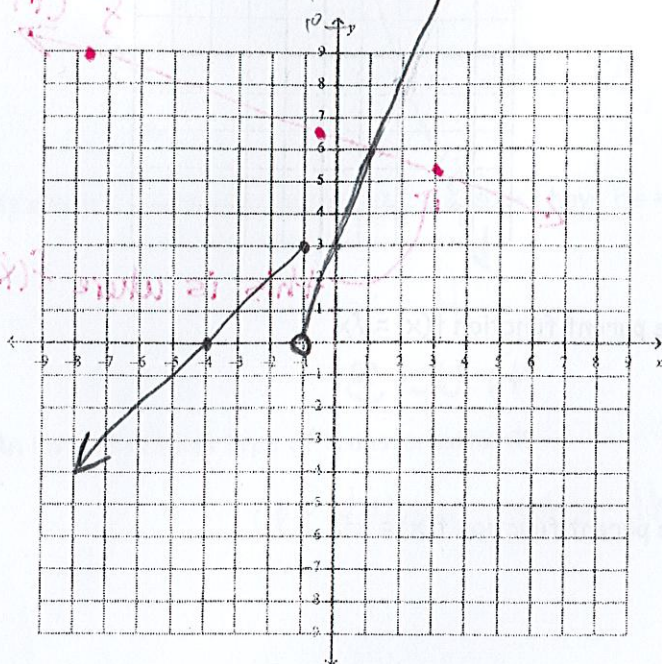
absolute min: $(2, -3)$ relative min: $(-1, 0)$

x-intercept(s): $(-1, 0)$ and $(1, 0)$ as $x \rightarrow -\infty, y \rightarrow \infty$

y-intercept(s): 1 as $x \rightarrow \infty, y \rightarrow \infty$

6) Graph the piecewise function and answer the following questions.

$$f(x) = \begin{cases} x + 4 & \text{if } x \leq -1 \\ 3|x + 1| & \text{if } -1 < x \leq 3 \\ \sqrt{2x + 1} - 2 & \text{if } x > 3 \end{cases}$$



domain: $(-\infty, 3]$

range: $(-\infty, 12]$

$f(-1) = 3$

$f(5) = \sqrt{2(5)+1} - 2 \approx 1.32$

$f(0) = 3$

(17 & 18) For each function below, find the domain and range of the original function. Find the inverse and state the domain and range of the inverse. Circle your answer for the inverse.

17) Original Function	$f(x) = x^2 - 4$	Inverse	$x = y^2 - 4$ $x + 4 = y^2$ $y^{-1} = \pm \sqrt{x + 4}$
Domain	$(-\infty, \infty)$	Domain	$[-4, \infty)$
Range	$[-4, \infty)$	Range	$(-\infty, \infty)$

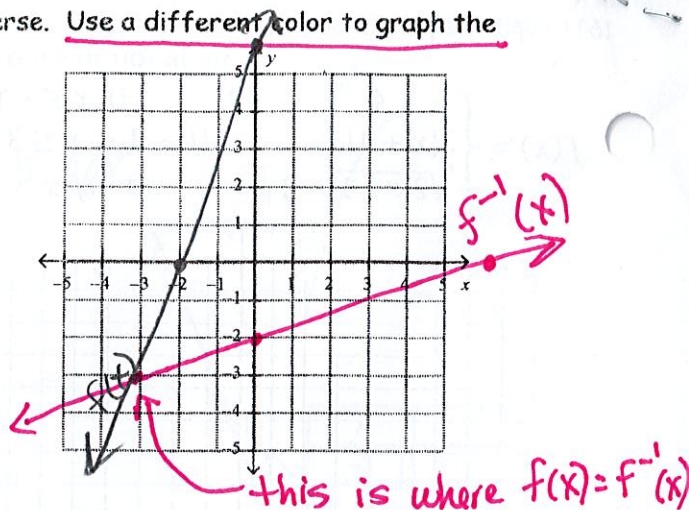
18) Original Function	$g(x) = 4x + 2$	Inverse	$x = 4y + 2$ $x - 2 = 4y$ $y^{-1} = \frac{x - 2}{4}$
Domain	$(-\infty, \infty)$	Domain	$(-\infty, \infty)$
Range	$(-\infty, \infty)$	Range	$(-\infty, \infty)$

- 19) Find the inverse of the function. Graph the function and its inverse. Use a different color to graph the inverse.

$$\begin{aligned} f(x) &= 3x + 6 \\ y &= 3x + 6 \\ x &= 3y + 6 \end{aligned}$$

$$\frac{x-6}{3} = \frac{3y}{3}$$

Inverse: $f^{-1}(x) = \frac{x-6}{3}$



- 20) Describe the translation(s): $f(x) = -2|x - 1| + 3$ from the parent function $f(x) = \sqrt{x}$.

- 1) reflection over x-axis
- 2) VE of 2
- 3) right 1
- 4) Up 3

- 21) Describe the translation(s): $f(x) = \frac{1}{2}(x - 3)^2 + 2$ from the parent function $f(x) = x^2$.

- 1) VC by $\frac{1}{2}$
- 2) right 3
- 3) Up 2

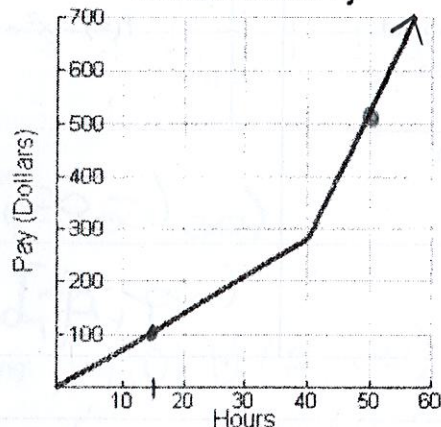
- 22) Suppose that Tony charted his Summer pay from hours 10-60. The piecewise function is given below, where y is pay in dollars and x is hours worked.

- a) Describe what is happening to Tony's pay between the hours 40-60.

it's increasing at a rate of \$10/hour

$$\frac{500}{50} = 10$$

Summer Job Pay



- a) Describe what is happening to Tony's pay between the hours 10-40.

it's increasing at a rate of \$6.67/hour

$$\frac{100}{15} \times 6.67$$

23. If $f(x) = |x| - 3$ and $g(x) = -\frac{1}{2}x + 2$, find when $f(x) = g(x)$ using the graphing calculator.

Put these in desmos & see where they meet (or cross each other)

$$(-10, 7) \quad \& \quad (3.3, 0.3)$$