

Name \_\_\_\_\_

8A, Algebra 1

Date \_\_\_\_\_

Period \_\_\_\_\_

Functions II Test

**\*\*Extra Review\*\***

1) Determine whether the following relation is linear, quadratic, cubic or neither. Why? Show all work!

x	y
0	2
1	4
2	6
3	8
4	10

2) What is the range of the following:  $y = (x + 2)^2 - 5$

3) Nick's Print Shop purchased a new printer for \$25,000. Each year it depreciates at a rate of 4%. What will its approximate value be at the end of the fifth year?

4) A bank advertised a rate of 5% interest compounded annually on one of its CD's. If a 10 year old CD is now worth \$3,257.79, find its original price.

5) What is the y-intercept of the following function, which two quadrants does the function lie in, and does the function show growth or decay?

$$y = 5^x$$

6) Describe how the following graph would change in relation to its parents graph.:

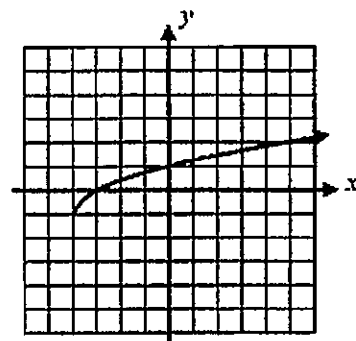
$$p(x) = -3\sqrt{x+3} + 5$$

7) Consider the function given by  $f(x) = x^2 + 3$ . Find its average rate of change from  $x = -1$  to  $x = 3$ . Show all work.

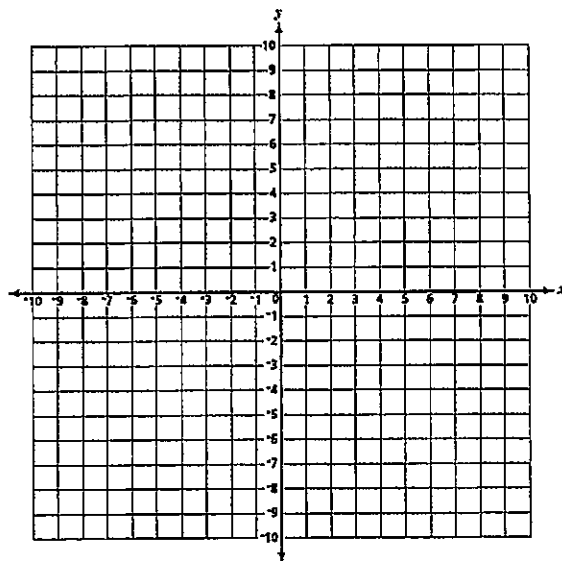
8) The graph of a parabola is created by transforming the graph  $y = x^2$ . What is the equation of the new function if the original is shifted four units to the right and three units up?

9) What is the vertex of :  $y = (x + 4)^2 - 6$

10) What is the equation for the following function?



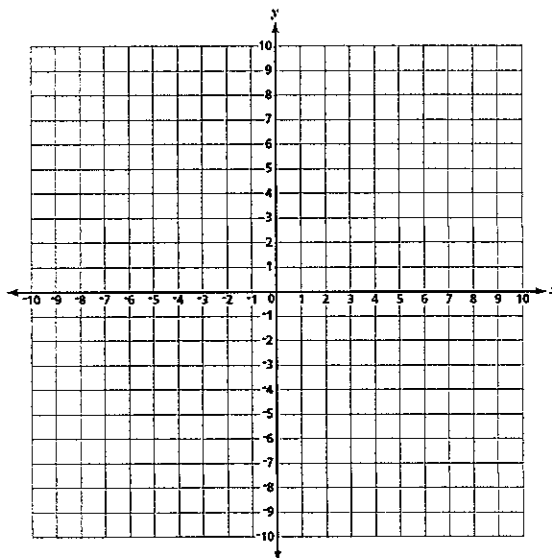
11) Graph the function  $f(x) = -\sqrt{x-2} - 3$  on the grid below. Then state its domain and range.



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

12) Graph the function:  $f(x) = (x + 2)^3 - 4$  over the interval  $[-3, 0]$  then state its domain and range



Domain: \_\_\_\_\_

Range: \_\_\_\_\_

13) Using question #12 what is the average rate of change of  $f(x)$  from  $-2 \leq x \leq 0$ ?

14) Graph:

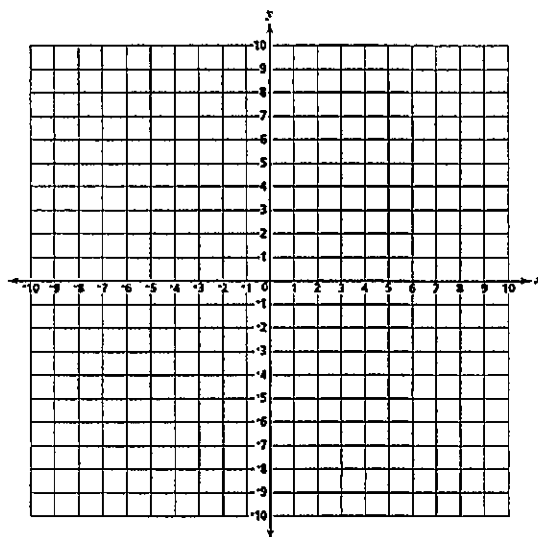
$$f(x) = \begin{cases} x^2 - 3, & x \leq 2 \\ x - 1, & x > 2 \end{cases}$$

a) What is the domain of the function?

\_\_\_\_\_

b) What is the range of the function?

\_\_\_\_\_

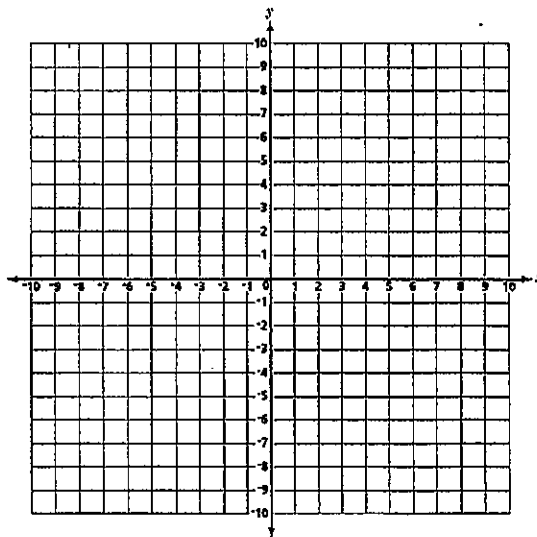


15) Graph:  $y = |x + 3| - 4$

a) What is the domain? \_\_\_\_\_

b) What is the range? \_\_\_\_\_

c) What is the vertex? \_\_\_\_\_

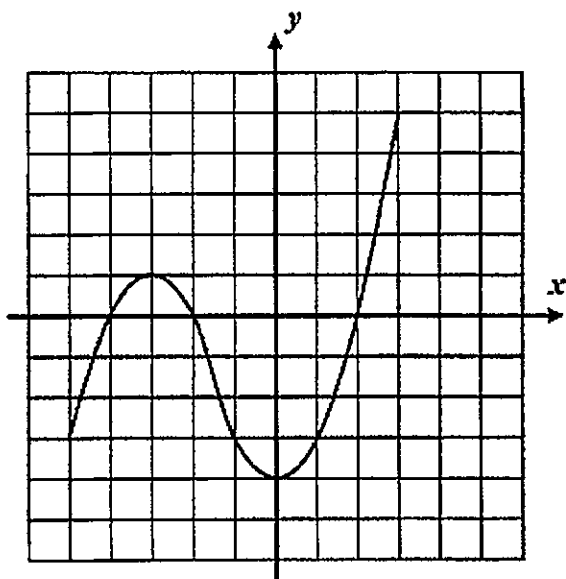


16) The function  $y = f(x)$  is shown graphed below over the interval  $-5 \leq x \leq 3$ .

(a) Evaluate each of the following:

$f(1) =$  \_\_\_\_\_

$f(-2) =$  \_\_\_\_\_



(b) What are the absolute maximum and absolute minimum value of the function?

Absolute maximum \_\_\_\_\_

Absolute minimum \_\_\_\_\_

(c) What are the x and y-intercepts of the function?

x-intercept(s): \_\_\_\_\_

y-intercept(s): \_\_\_\_\_

(d) Give one interval over which the function is increasing and one interval over which it is decreasing.

Increasing: \_\_\_\_\_

Decreasing: \_\_\_\_\_

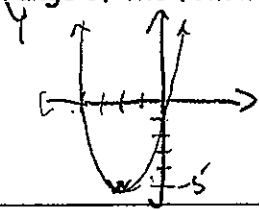
Functions II Test  
\*\*Extra Review\*\*

1) Determine whether the following relation is linear, quadratic, cubic or neither. Why? Show all work!

	x	y	
	0	2	
+1	1	4	+1
+1	2	6	+2
+1	3	8	+2
+1	4	10	+2

- Linear B/C the rates of change are constant on the 1st try or 1st common difference

2) What is the range of the following:  $y = (x+2)^2 - 5$



V: (-2, -5)

$y \geq -5$  or  $[-5, \infty)$

3) Nick's Print Shop purchased a new printer for \$25,000. Each year it depreciates at a rate of 4%. What will its approximate value be at the end of the fifth year?

$$A = P(1 - r)^n$$

$$A = 25,000(1 - 4\%)^5$$

$$A = 25,000(1 - .04)^5$$

$$A = 25,000(.96)^5$$

$$A = 20,384.32$$

\* Round to the nearest hundredth

$\$20,384.32$

4) A bank advertised a rate of 5% interest compounded annually on one of its CD's. If a 10 year old CD is now worth \$3,257.79, find its original price.

$$A = P(1 + r)^n$$

$$3,257.79 = P(1 + 5\%)^{10}$$

$$3,257.79 = P(1 + .05)^{10}$$

$$\frac{3,257.79}{(1.05)^{10}} = \frac{P(1.05)^{10}}{(1.05)^{10}}$$

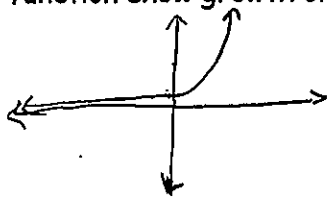
\* Round to the nearest hundredth

$\$2,000.00$

$P = 2000.00$

5) What is the y-intercept of the following function, which two quadrants does the function lie in, and does the function show growth or decay?

$$y = 5^x$$



- y-intercept: (0, 1)
- Quadrants: I + II
- Growth

Decay: Base is decimal  
 $0 < b < 1$   
 $b^x$

6) Describe how the following graph would change in relation to its parents graph.:

$$p(x) = -3\sqrt{x+3} + 5$$

$\uparrow$     $\uparrow$     $\uparrow$   
 ①   ②   ③

- ① Reflection in the x-axis
- ② narrower (stretched vertically) by a scale factor of 3
- ③ Translated (shifted) 3 units left + 5 units up from (0,0)

7) Consider the function given by  $f(x) = x^2 + 3$ . Find its average rate of change from  $x = -1$  to  $x = 3$ . Show all work.

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{12 - 4}{3 - (-1)} = \frac{8}{4} = 2$$

x	f(x)
-1	4
0	3
1	4
2	7
3	12

$f(x) = x^2 + 3$   
 $f(-1) = (-1)^2 + 3$   
 $f(-1) = 1 + 3$   
 $f(-1) = 4$

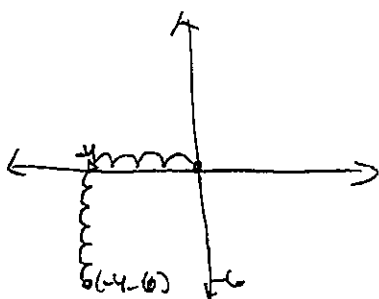
$f(x) = x^2 + 3$   
 $f(3) = (3)^2 + 3$   
 $f(3) = 9 + 3$   
 $f(3) = 12$

8) The graph of a parabola is created by transforming the graph  $y = x^2$ . What is the equation of the new function if the original is shifted four units to the right and three units up?

$$y = (x - 4)^2 + 3$$

$\uparrow$     $\uparrow$   
 Right   Up  
 4   3

9) What is the vertex of:  $y = (x + 4)^2 - 6$

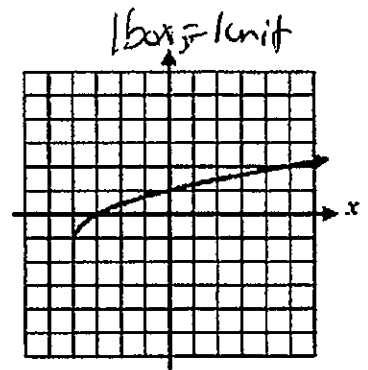


left 4   down 6 from (0,0)

$$V: (-4, -6)$$

10) What is the equation for the following function?

$y = \sqrt{(x+4)} - 1$  starting point:  $(-4, -1)$   
 4 left 1 down



11) Graph the function  $f(x) = -\sqrt{x-2} - 3$  on the grid below. Then state its domain and range.

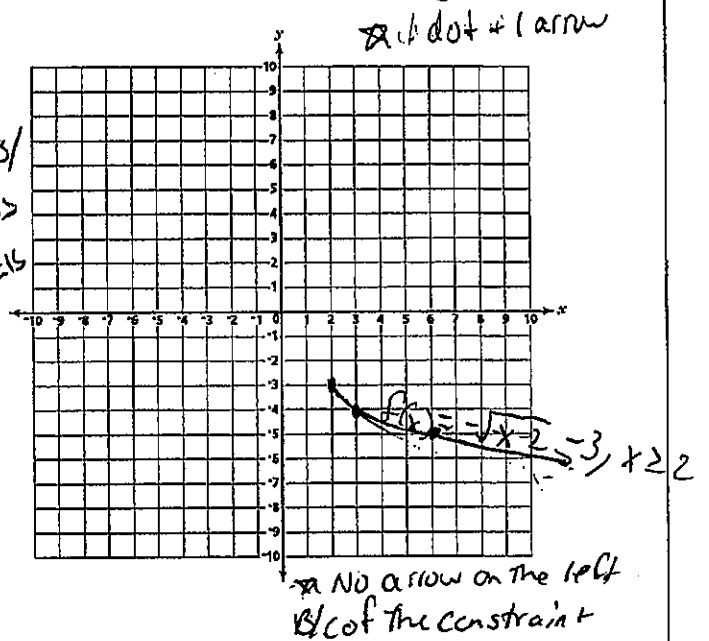
$x-2 \geq 0$   $\leftarrow$  NO negative radicands  
 $+2 \quad +2$   
 $x \geq 2$  Constraint

$x$	$f(x)$
2	-3
3	-4
6	-5

only copy whole #s / integers NO decimals

Domain:  $\{x | x \geq 2\}$  or  $[2, \infty)$   $\leftarrow$  Interval notation

Range:  $\{y | y \leq -3\}$  or  $(-\infty, -3]$   $\leftarrow$  Numerical order



12) Graph the function:  $f(x) = (x+2)^3 - 4$  over the interval  $[-3, 0]$  then state its domain and range

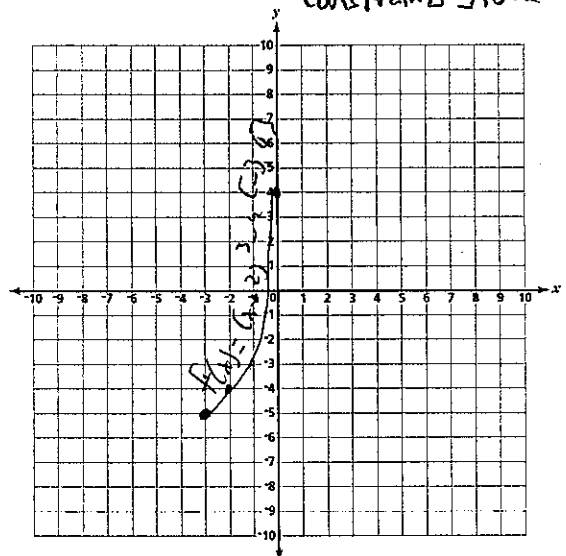
Translated 2 units left & 4 units down

$x$	$f(x)$
-3	-5
-2	-4
-1	-3
0	4

Domain  $-3 \leq x \leq 0$   $\leftarrow$  NO arrows b/c of constraints given

Domain:  $\{x | -3 \leq x \leq 0\}$  or  $[-3, 0]$

Range:  $\{y | -5 \leq y \leq 4\}$  or  $[-5, 4]$





13) Using question #12 what is the average rate of change of  $f(x)$  from  $-2 \leq x \leq 0$ ?

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(0) - f(-2)}{0 - (-2)} = \frac{4 - (-4)}{0 - (-2)} = \frac{8}{2} = \boxed{4}$$

Use table from #12 together for y-values

x	f(x)
-3	-5
-2	-4
-1	-3
0	4

14) Graph:

$$f(x) = \begin{cases} x^2 - 3, & x \leq 2 \\ x - 1, & x > 2 \end{cases}$$

If one domain is open and closed at the same time, the domain value is closed!

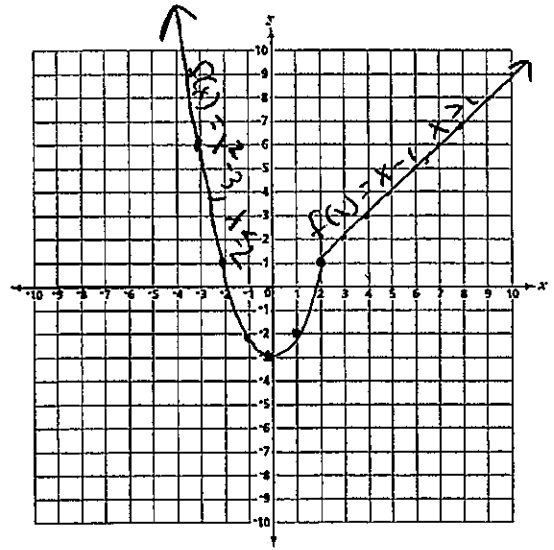
$f(x) = x^2 - 3, x \leq 2$

x	f(x)
-3	6
-2	1
-1	-2
0	-3
1	-2
2	1

closed

$f(x) = x - 1, x > 2$

m: 1  
B: -1



a) What is the domain of the function?

all reals or  $\{x | x \in \mathbb{R}\}$  or  $(-\infty, \infty)$

↑ S.B.                      ↑ I.N.

b) What is the range of the function?

$\{y | y \geq -3\}$  or  $[-3, \infty)$

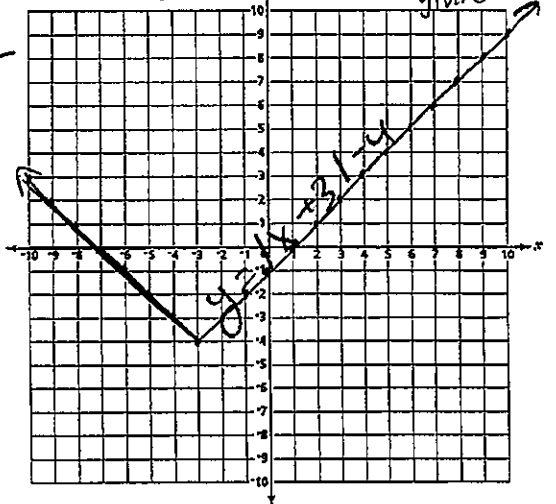
15) Graph:  $y = |x + 3| - 4$

MATHS → NUM 1

x & y small values from -10 to +10

x	y
-10	3
-9	2
-8	1
-7	0
-6	-1
-5	-2
-4	-3
-3	-4
-2	-3
-1	-2
0	-1
1	0
2	1
3	2

RAMONS (NO constraints given)



a) What is the domain? All reals or  $\{x | x \in \mathbb{R}\}$  or  $(-\infty, \infty)$

b) What is the range?  $\{y | y \geq -4\}$  or  $[-4, \infty)$

c) What is the vertex?  $(-3, -4)$

16) The function  $y = f(x)$  is shown graphed below over the interval  $-5 \leq x \leq 3$ .

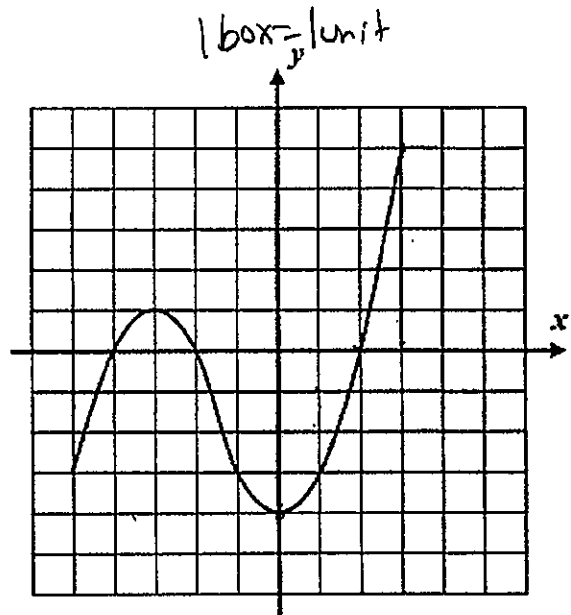
(a) Evaluate each of the following:

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

$\downarrow$                        $\uparrow$   
 $x$                        $y$

$$f(-2) = \frac{0}{-2}$$

$\uparrow$                        $\uparrow$   
 $x$                        $y$



(b) What are the absolute maximum and absolute minimum value of the function?

highest point  
 $\uparrow$   
 Absolute maximum  $y = 5$  or  $(3, 5)$

lowest point  
 $\uparrow$   
 Absolute minimum  $y = -4$  or  $(0, -4)$

Describe using the y-value or give the coordinate

(c) What are the x and y-intercepts of the function?

x-intercept(s):  $x = -4, x = -2, x = 2$  or  $\{-4, -2, 2\}$   
 $\uparrow$   
 where  $y = 0$

y-intercept(s):  $y = -4$  or  $\{-4\}$   
 $\downarrow$   
 where  $x = 0$

(d) Give one interval over which the function is increasing and one interval over which it is decreasing.  
 \*use x-values\*

Increasing:  $(-5, -3) \cup (0, 3)$   
 $\rightarrow \{x \mid -5 < x < -3 \text{ or } 0 < x < 3\}$   
 $\rightarrow$  between  $x = -5$  +  $-3$  or  
 between  $x = 0$  +  $x = 3$

Decreasing:  $(-3, 0)$  or  $\{x \mid -3 < x < 0\}$   
 or between  $x = -3$  +  $x = 0$