NO CALCULATOR

Pre Calculus **Name** KEY

Ch 3 and 4 Cumulative Review Sheet **Date** _____ **Period** _____

1. Find the domain of the function. Write your answer in interval notation.

$f(x) = \dfrac{\sqrt{x}}{|x|}$ $x \geq 0$ $x \neq 0$

Domain $(0, \infty)$ interval notation

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

2. Find the domain of the function. Write your answer in interval notation.

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

$x \neq -2$ $x \neq 1$ $x \geq -1$

Don't need if $x > -1$

Domain $(-1, 1) \cup (1, \infty)$

$\{x \mid x > -1, x \neq 1\}$

3. Use the graph of the function f to answer the following questions.

a) State the domain: $(-4, 6]$

b) State the range: $[-4, 4]$

c) List the y-intercept(s) $(0, 2)$

d) List the x-intercept(s) $(-3, 0)$ $(1, 0)$ $(5, 0)$

e) Find $f(-2)$ when $x = -2$, $f(-2) = 2$

f) For what values of x does $f(x) = 2$?

$x = -2, 0, 6$

g) For what values of x is $f(x) \leq 0$? (or equal)

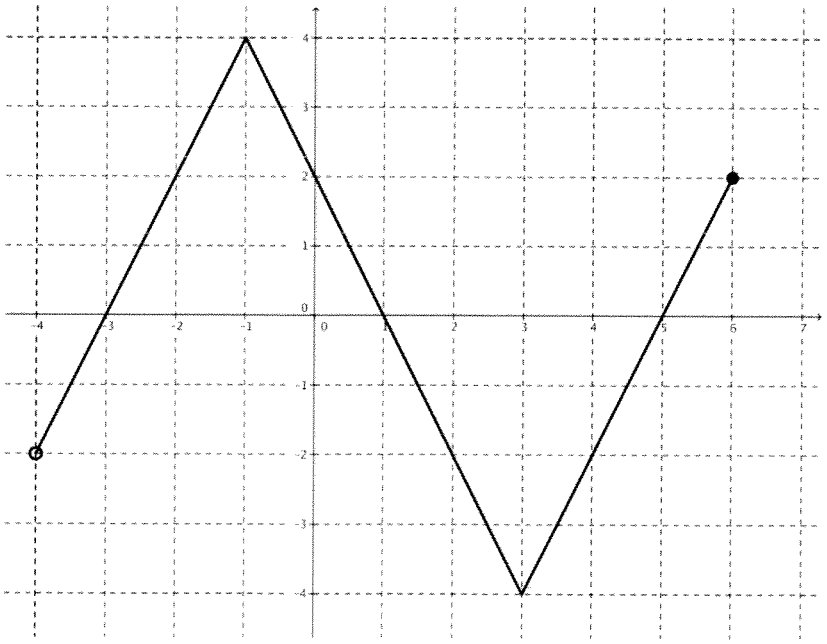
Give your answer in interval notation. (x's only)

$(-4, -3] \cup [1, 5]$

h) Over what interval(s) is f decreasing?

$(-1, 3)$

function f



i) Over what interval(s) is f increasing?

$(-4, -1) \cup (3, 6)$

j) List the local maximum(s).

When $x = -1$, the local max is 4

k) List the local minimum(s).

When $x = 3$, the local min is -4

l) Is f even, odd or neither?

NEITHER

Symmetric over y-axis (NO)

symmetric over origin. (NO)

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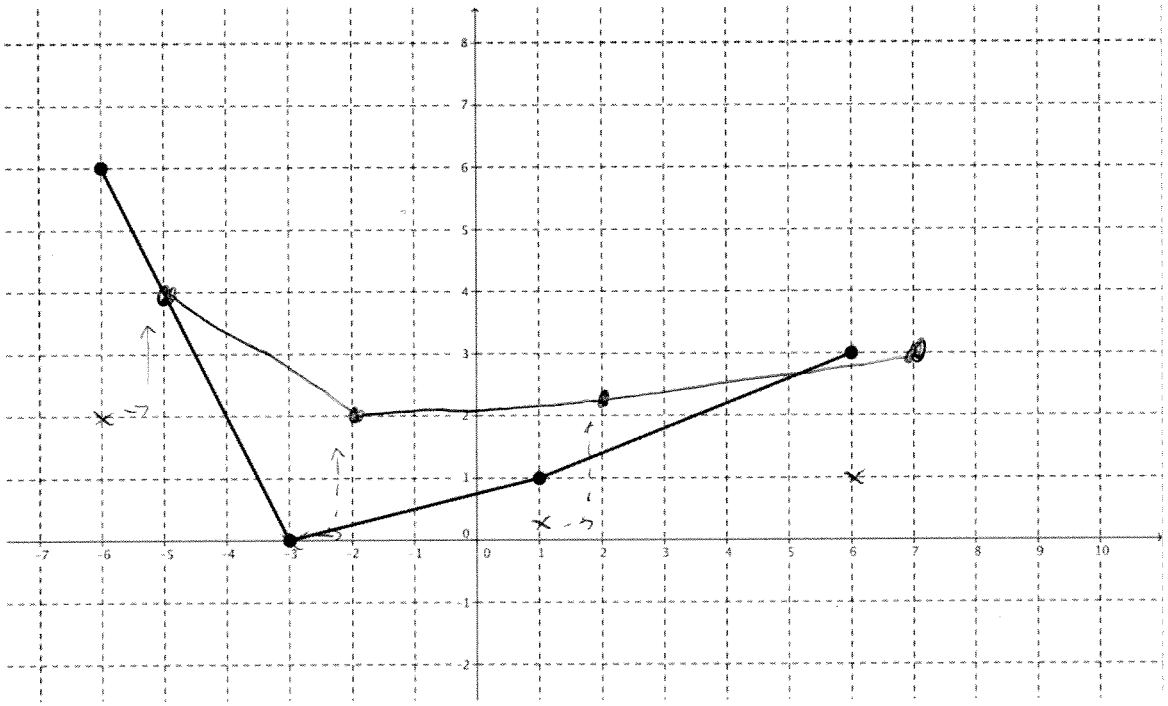
4. The graph of a function f is illustrated on the grid below.

a. List the transformations to graph $F(x) = \frac{1}{3} f(x-1) + 2$

Vertical shrink by $\frac{1}{3}$
Horizontal shift Right 1
Vertical shift Up 2

b. Graph *F(x)* on the grid.transformed to the graph of **AND** draw the graph of *F(x)*.



5. Graph the function, showing **at least five points**. Then fill in the blanks below.

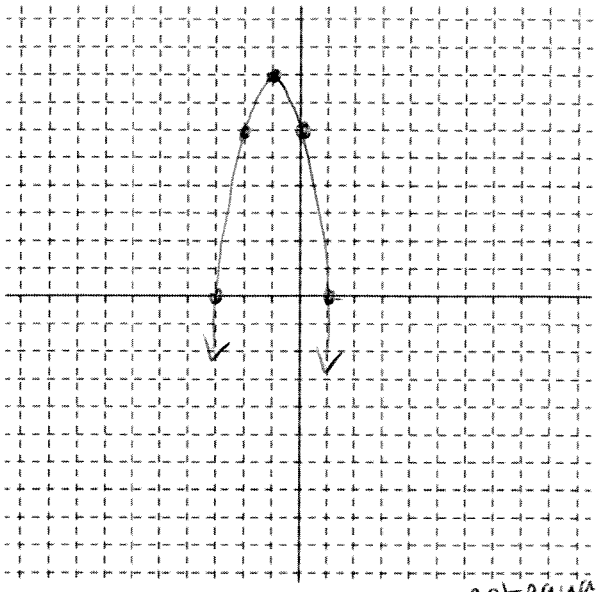
$f(x) = -2x^2 - 4x + 6$

$a = -2$
$b = -4$
$c = 6$

$\frac{-b}{2a} = \frac{-(-4)}{2(-2)}$

$= \frac{4}{-4} = -1$

x	y
-3	0
-2	6
-1	8
0	6
1	0



Coordinate of the Vertex (-1, 8)

Equation for the Axis of Symmetry $x = -1$

x-intercepts (-3, 0) (1, 0)

y-intercepts (0, 6)

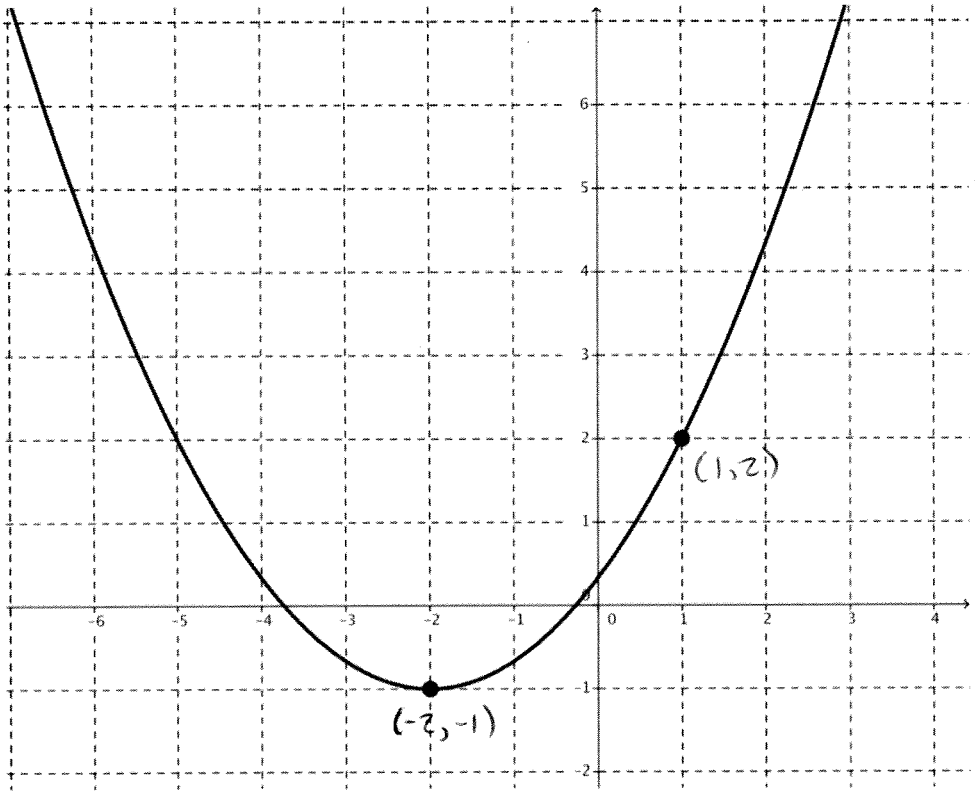
Where is $f(x) > 0$? (-3, 1) (above) (not equal to 0.)

Where is $f(x) < 0$? $(-\infty, -3) \cup (1, \infty)$ (below)

Domain $(-\infty, \infty)$

Range $(-\infty, 8]$

6. Determine the quadratic function whose graph is given.



$y = a(x+2)^2 - 1$

$2 = a(1+2)^2 - 1$

$2 = a(3)^2 - 1$

$2 = 9a - 1$

$+1 \quad +1$

$\frac{3}{9} = \frac{9a}{9}$

$\frac{1}{3} = a$

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

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

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

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

Standard Form: $f(x) = \frac{1}{3}x^2 + \frac{4}{3}x + \frac{1}{3}$

7. a. Solve the inequality. Write your answer in interval notation.

$x(x+3) \geq -2$

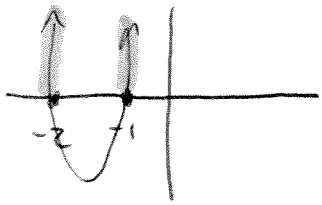
$(-\infty, -2] \cup [-1, \infty)$

$x^2 + 3x \geq -2$

$x^2 + 3x + 2 \geq 0$

$(x+2)(x+1) \geq 0$

$x = -2 \quad x = -1$



b. Solve the inequality. Write your answer in interval notation.

$2x^2 > 12x + 14$

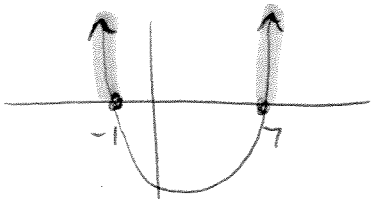
$(-\infty, -1) \cup (7, \infty)$

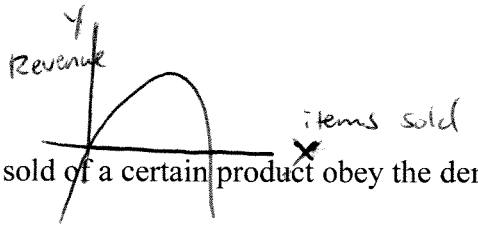
$2x^2 - 12x - 14 > 0$

$2(x^2 - 6x - 7) > 0$

$2(x+1)(x-7) > 0$

$x = -1 \quad x = 7$





8. The price p (in dollars) and the quantity x sold of a certain product obey the demand equation

$$p = -\frac{1}{30}x + 120$$

a) Express the revenue R as a function of x where $R = xp$.

$R(x) = -\frac{1}{30}x^2 + 120x$

$R = x\left(-\frac{1}{30}x + 120\right)$

b) Find the quantity of x that maximizes revenue.

1800

$x = \frac{-b}{2a} = \frac{-(120)}{2(-\frac{1}{30})} = \frac{-120}{-\frac{1}{15}} = \frac{120}{1} \cdot \frac{15}{1} = 1800$

c) Find the maximum revenue.

\$108,000

$= -\frac{1}{30}(1800)^2 + 120(1800)$

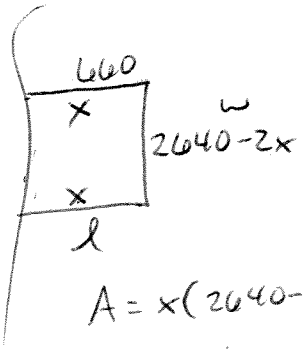
$= 108000$

d) Find the price that produces the maximum revenue.

\$60

$p = -\frac{1}{30}(1800) + 120 = \frac{-180}{3} + 120 = -60 + 120 = 60$

9. A farmer with 2640 meters of fencing wants to enclose a rectangular plot that borders a barn. If the farmer does not fence the side along the barn, what is the largest area that can be enclosed? Express the area A of the rectangle as a function of x. Find the maximum area, the length and the width of the rectangle.



Equation for A as a function of x $A(x) = -2x^2 + 2640x$

Maximum Area 871,200 m^2

Width 1320 m

Length 660 m

$A = x(2640 - 2x)$

$= 2640x - 2x^2$

$= -2x^2 + 2640x$

$x = \frac{-2640}{2(-2)} = \frac{-2640}{-4} = 660$

$2640 - 2(660)$

$2640 - 1320$

1320

$A = 660(1320)$

$= 871,200$