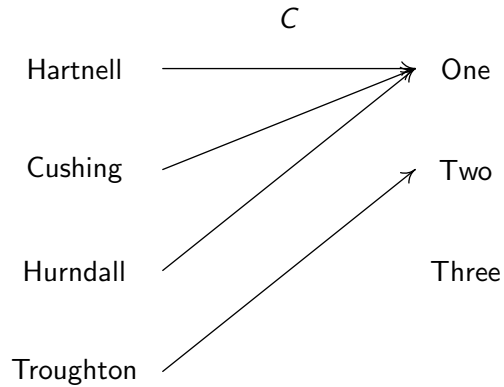


MATH 1650: TEST 01 (100 points.)

NAME: _____

DIRECTIONS: To receive full credit, make sure your work is neat and complete.

1. (a) Explain why the mapping C below represents a function:



- (b) State the domain and range of this function:

domain:

range:

- (c) If we reversed the arrows in C would the resulting mapping be a function? Explain why or why not.

2. Let $f(x) = x^2 - 3x$.

(a) Find and simplify $f(-2)$.

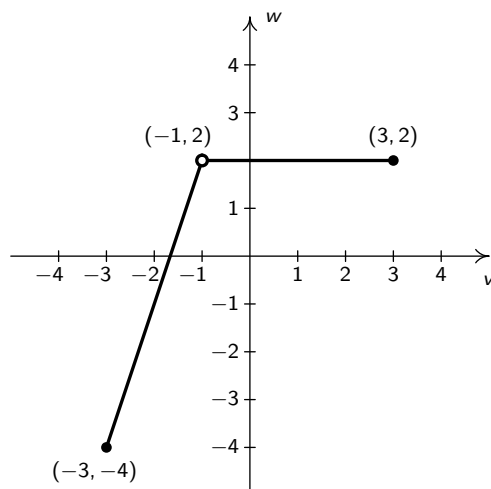
(b) Find and simplify an expression for $f(2x)$.

(c) Find and simplify an expression for $2f(x)$.

(d) Find and simplify an expression for $f(x) + 2$.

(e) Find and simplify an expression for $f(x + 2)$.

3. Consider the graph of $y = f(x)$ below.



(a) State the domain and range using interval notation:

• **domain:**

• **range:**

(b) State the interval(s), if any, over which f is:

• **increasing:**

• **decreasing:**

• **constant:**

(c) Find a possible formula for $f(x)$.

$$f(x) = \begin{cases} \underline{\hspace{2cm}}, & \text{if } \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}}, & \text{if } \underline{\hspace{2cm}} \end{cases}$$

4. Suppose $V(t)$ gives the value of a car (in dollars) t years after it is purchased.

What does the statement $V(5) = 3000$ mean in terms of time and value of the car?

5. The cost in dollars, $C(g)$ to use g gigabytes of data per month on a mobile phone plan is modeled by

$$C(g) = \begin{cases} 15 & \text{if } 0 \leq g \leq 2 \\ 15 + 5(g - 2) & \text{if } g > 2 \end{cases}$$

(a) How much does it cost to use 1.875 gigabytes of data per month with this plan?

(b) How much does it cost to use 5 gigabytes of data per month with this plan?

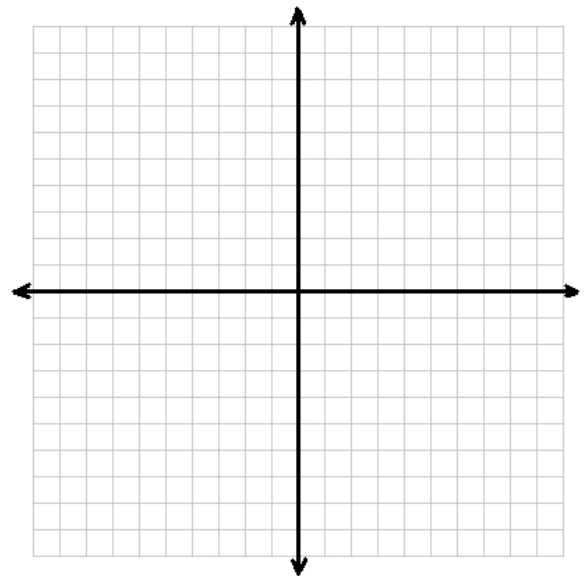
(c) Fill-in the blanks below:

To use up to (and including) _____ gigabytes of data per month, it costs _____ .

For each gigabyte over _____, it costs an additional _____ per month.

6. Rewrite $f(x) = 1 - |3x - 6|$ in the form $f(x) = a|x - h| + k$ to help you graph f .

Algebraically determine the vertex, axis intercepts (if any.)



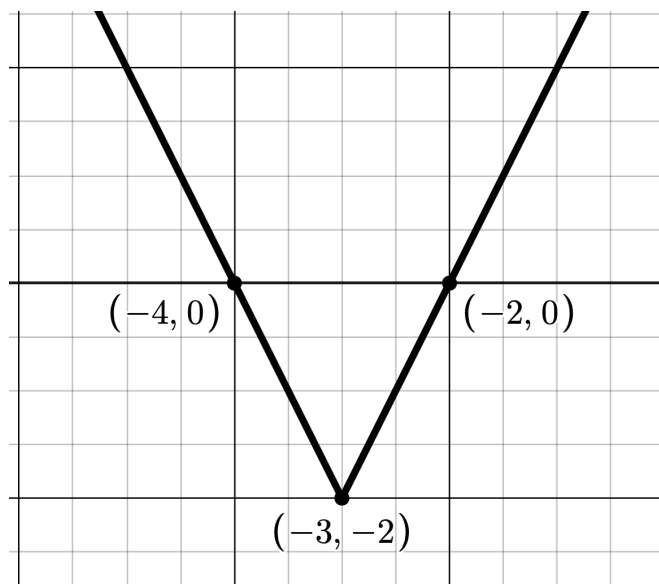
vertex:

x-intercept(s):

y-intercept(s):

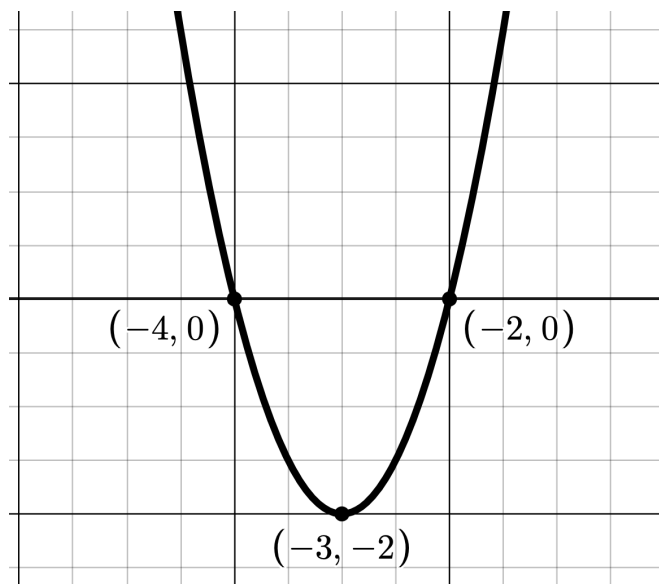
7. Find a possible formula for the function whose graph is below of the form $f(x) = a|x - h| + k$.

Explain your reasoning.



8. Find a possible formula for the function whose graph is below of the form $f(x) = a(x - h)^2 + k$.

Explain your reasoning.

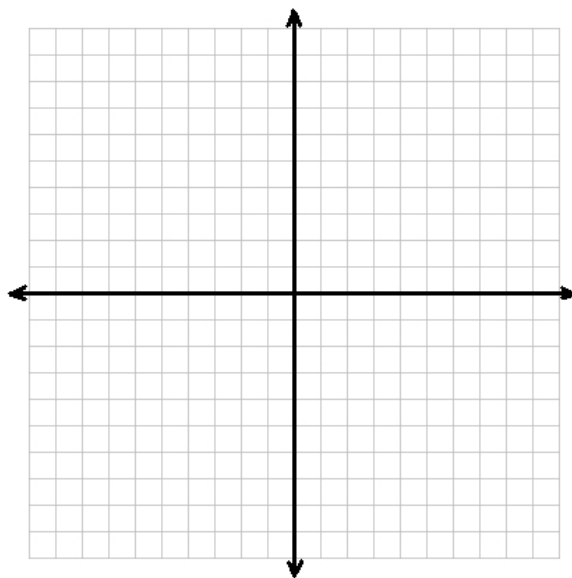


9. (a) Make a Sign Diagram for $f(x) = x^2 - 3x - 10$.

(b) Use your Sign Diagram in 9a to help you solve: $x^2 \leq 3x + 10$.

10. (a) Algebraically find the intersection points of the graphs of $f(x) = |2x - 1|$ and $g(x) = 5 - x$.

(b) Use your answers to 10a along with a graph to help you solve $|2x - 1| < 5 - x$. Explain your reasoning.



11. Carl's friend Jason participates in the Highland Games. In one event, the hammer throw, the height $h(t)$ in feet of the hammer above the ground t seconds after Jason lets it go is modeled by the function:

$$h(t) = -16t^2 + 22t + 6$$

- (a) i. How does the formula for $h(t)$ inform you that the graph of h is a parabola?

- ii. How can you tell the parabola is opening downwards?

- (b) Use the **vertex formula** to help you determine the coordinates of the vertex of the graph of h .

Round your answers to two decimal places.

- (c) What do each of the coordinates of the vertex mean in this particular context?

(d) Use the **quadratic formula** to help you solve $h(t) = 0$. Round your answers to two decimal places.

(e) What do the solutions to $h(t) = 0$ mean in this particular context?