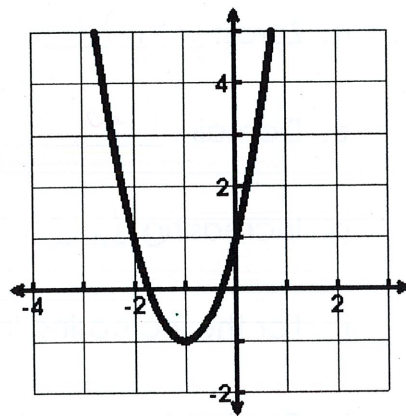


Name: Key Date: _____

Characteristics of Functions

1. $f(x) = 2x^2 + 4x + 1$

- a. Domain: $(-\infty, \infty)$ b. Range: $[-1, \infty)$
- c. Extrema: $\min(-1, -1)$ d. Zeros: $(-0.29, 0)$ $(-1.71, 0)$
- e. Increasing: $(-1, \infty)$ f. Decreasing: $(-\infty, -1)$
- g. End Behavior: $x \rightarrow -\infty, y \rightarrow \infty$
 $x \rightarrow \infty, y \rightarrow \infty$

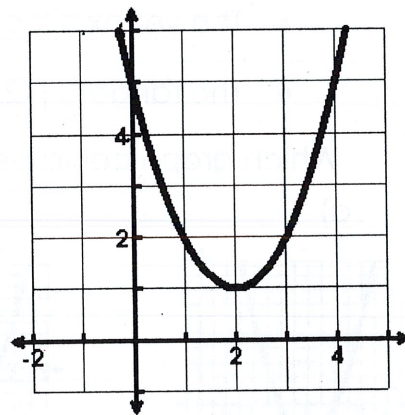


h. Average rate of change $[0, 2]$ $\frac{f(2) - f(0)}{2 - 0} = \frac{17 - 1}{2} = 8$

$f(0) = 1$
 $f(2) = 17$

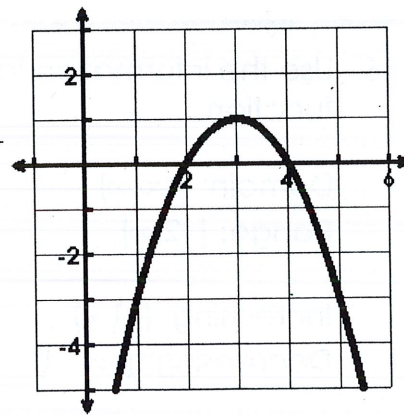
2. $f(x) = (x - 2)^2 + 1$

- a. Range: $[1, \infty)$ b. Y-intercept: $(0, 5)$
 - c. Extrema: $\min(2, 1)$ d. Axis of Sym: $x = 2$
 - e. Increasing: $(2, \infty)$ f. Decreasing: $(-\infty, 2)$
 - g. Average rate of change $[0, 2]$ $\frac{f(2) - f(0)}{2 - 0} = \frac{1 - 5}{2} = -2$
- $f(0) = 5$
 $f(2) = 1$



3. $f(x) = -(x - 2)(x - 4)$

- a. Domain: $(-\infty, \infty)$ b. Range: $(-\infty, 1]$
- c. Axis of Sym: $x = 3$ d. x - intercepts: $(2, 0)$ $(4, 0)$
- e. Increasing: $(-\infty, 3)$ f. Decreasing: $(3, \infty)$
- g. End Behavior: $x \rightarrow -\infty, y \rightarrow -\infty$
 $x \rightarrow \infty, y \rightarrow -\infty$



h. Average rate of change $[0, 2]$ $\frac{f(2) - f(0)}{2 - 0} = \frac{0 - (-8)}{2} = 4$

$f(0) = -8$
 $f(2) = 0$

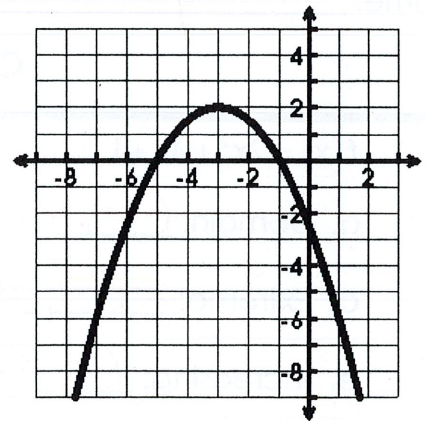
4. This graph represents a quadratic function.

a. Extrema: Max $(-3, 2)$ b. Axis of Sym: $x = -3$

c. Zeros: $(-5, 0)$ $(-1, 0)$ d. y-intercept: $(0, -2.5)$

e. Domain: $(-\infty, \infty)$ f. Range: $(-\infty, 2]$

g. Increasing: $(-\infty, -3)$ h. Decreasing: $(-3, \infty)$



i. For the increasing interval, is the rate of change increasing or decreasing?

Decreasing

j. For the decreasing interval, is the rate of change increasing or decreasing?

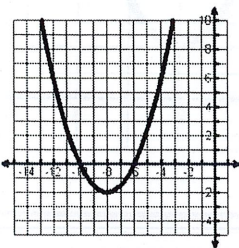
Increasing

5. The quadratic function $f(x)$ has these characteristics:

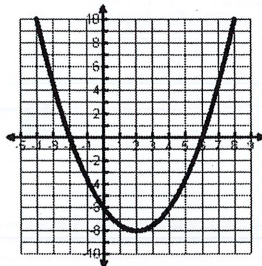
- The vertex is located at $(8, -2)$.
- The range is $[-2, \infty)$.

Which graph could be $f(x)$?

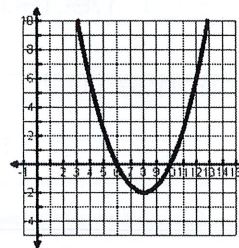
a)



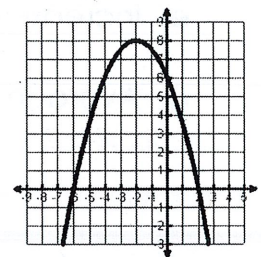
b)



c)



d)



6. Use the information for a given quadratic function to sketch a picture of the function.

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

Range: $[-2, \infty)$

Increasing: $(-1, \infty)$

Decreasing: $(-\infty, -1)$

There is no stretch or shrink ($a = 1$)

