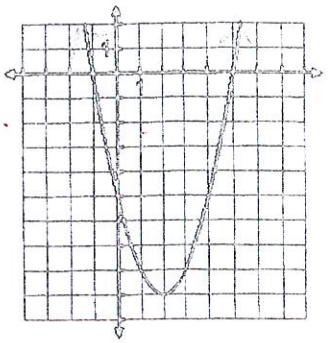
1. Domain: $(-\infty, \infty)$ Range: $(-9, \infty)$

Vertex: $(2, -9)$ Extrema: min $(2, -9)$

X intercept(s): $(-1, 0)$ + $(5, 0)$ Y Intercept: $(0, -5)$

Increasing: $(2, \infty)$ Decreasing: $(-\infty, 2)$

Axis of Symmetry: $x = 2$



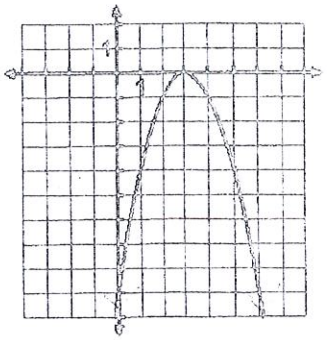
2. Domain: $(-\infty, \infty)$ Range: $(-\infty, 0)$

Vertex: $(3, 0)$ Extrema: max $(3, 0)$

X intercept(s): $(3, 0)$ Y Intercept: $(0, -9)$

Increasing: $(-\infty, 3)$ Decreasing: $(3, \infty)$

Axis of Symmetry: $x = 3$



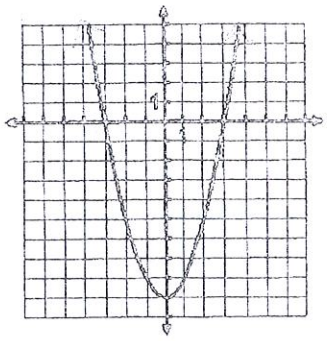
3. Domain: $(-\infty, \infty)$ Range: $(-9, \infty)$

Vertex: $(0, -9)$ Extrema: min $(0, -9)$

X intercept(s): $(3, 0)$ + $(-3, 0)$ Y Intercept: $(0, -9)$

Increasing: $(0, \infty)$ Decreasing: $(-\infty, 0)$

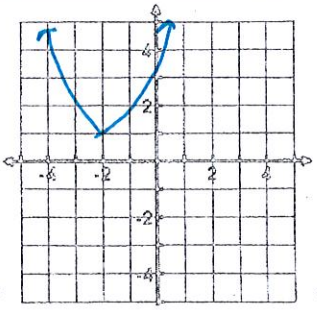
Axis of Symmetry: $x = 0$



Use the information to sketch a quadratic.

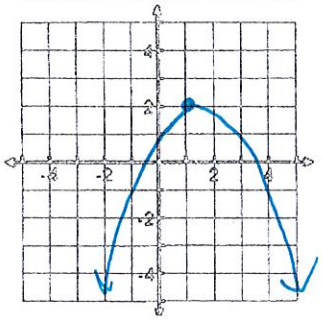
4. Domain: all real numbers
   Range: $y \geq 1$

   Increasing: $-2 < x < \infty$
   Decreasing: $-\infty < x < -2$
   There is no stretch or shrink (a = 1)



5. Domain: all real numbers
   Vertex: (1, 2)

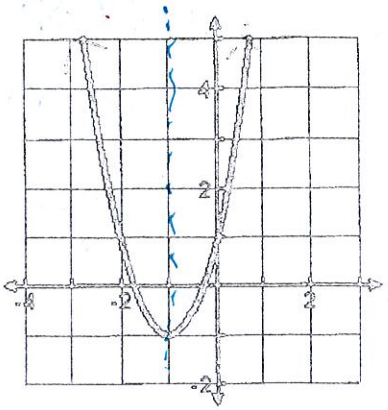
   Increasing: $-\infty < x < 1$
   Decreasing: $1 < x < \infty$
   ~~There is no stretch or shrink (a = 1)~~



Name: _____ Date: _____

Characteristics of Functions

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



a. Domain: $(-\infty, \infty)$ b. Range: $(-1, \infty)$

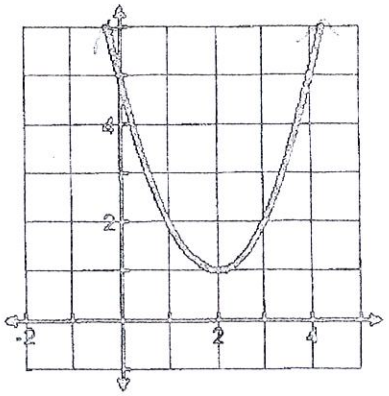
c. Extrema: min $(-1, 1)$ d. Axis of Sym: $x = -1$

e. Increasing: $(1, \infty)$ f. Decreasing: $(-\infty, 1)$

g. End Behavior: $x \to \infty, y \to \infty$ & $x \to -\infty, y \to \infty$

h. Average rate of change $0 \le x \le 2$

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



a. Domain: $(-\infty, \infty)$ b. Range: $(1, \infty)$

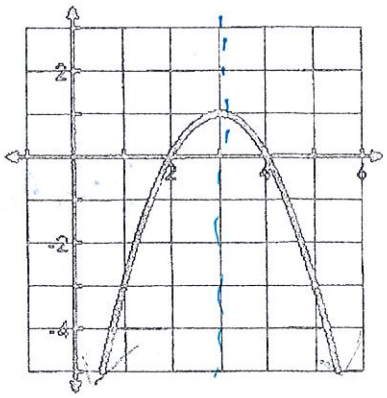
c. Extrema: min $(2, 1)$ d. Axis of Sym: $x = 2$

e. Increasing: $(2, \infty)$ f. Decreasing: $(-\infty, 2)$

g. End Behavior: $x \to \infty, y \to \infty$ & $x \to -\infty, y \to \infty$

h. Average rate of change $0 \le x \le 2$

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



a. Domain: $(-\infty, \infty)$ b. Range: $(-\infty, 1)$

c. Extrema: max $(3, 1)$ d. Axis of Sym: $x = 3$

e. Increasing: $(-\infty, 3)$ f. Decreasing: $(3, \infty)$

g. End Behavior: $x \to \infty, y \to -\infty$ & $x \to -\infty, y \to -\infty$

h. Average rate of change $0 \le x \le 2$