MA 103 Quadratic Functions and their Graphs
Section 8.6

Given a quadratic function in the form $y = f(x) = a(x-h)^2 + k$,

- The graph is always a parabola
- The vertex occurs at (h, k)
- The direction of opening is upward if a > 0 and downward if a < 0
- The axis of symmetry is the vertical line with equation x = h.
- The y-intercept is found by substituting x = 0 into the function and finding $f(0)$
- The domain is $(-\infty, \infty)$
- The range of the function can be determined from the graph

For each quadratic function below,

(a) State the coordinates of the vertex.
(b) State the direction of opening .
(c) Find the equation of the axis of symmetry.
(d) Find the y-intercept.
(e) Sketch the graph. **DO NOT USE YOUR CALCULATOR.**
(f) State the domain.
(g) State the range.

1. $f(x) = (x-2)^2 - 9$

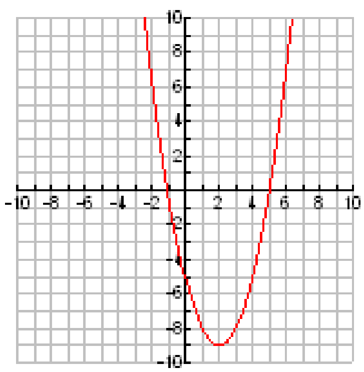
(a) (2, -9)

(b) up

(c) x = 2

(d) (0, -5)

(e)



(f) $(-\infty, \infty)$

(g) $(-9, \infty)$

2. $g(x) = -3(x+1)^2 - 6$

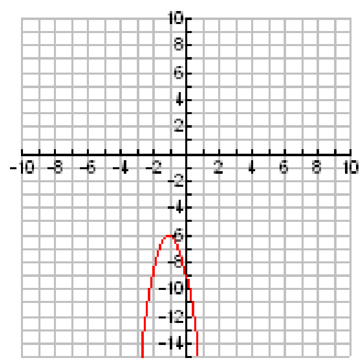
(a) (-1, -6)

(b) down

(c) x = -1

(d) (0, -9)

(e)



(f) $(-\infty, \infty)$

(g) $(-\infty, -6]$

3. $h(x) = 2x^2 + 3$

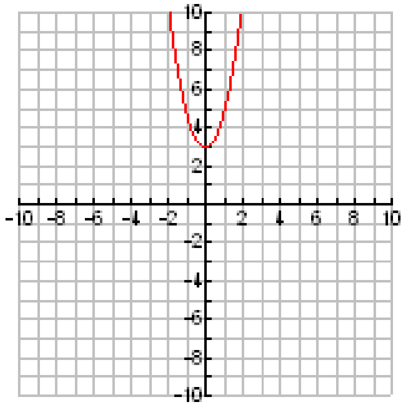
(a) (0, 3)

(b) up

(c) x = 0

(d) (0, 3)

(e)



(f) $(-\infty, \infty)$

(g) $[3, \infty)$

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

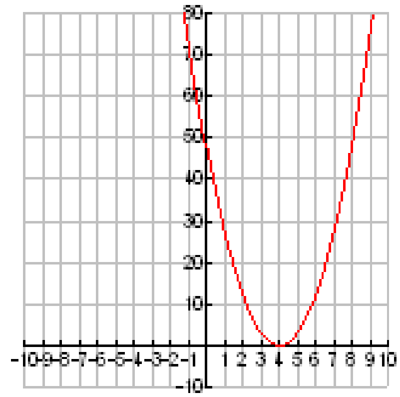
(a) (4, 0)

(b) up

(c) x = 4

(d) (0, 48)

(e)



(f) $(-\infty, \infty)$

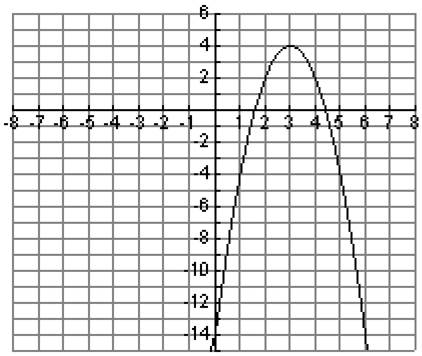
(g) $[0, \infty)$

5. Match the equation with the corresponding graph from those shown below. **DO NOT USE YOUR CALCULATOR TO GRAPH THE FUNCTIONS.**

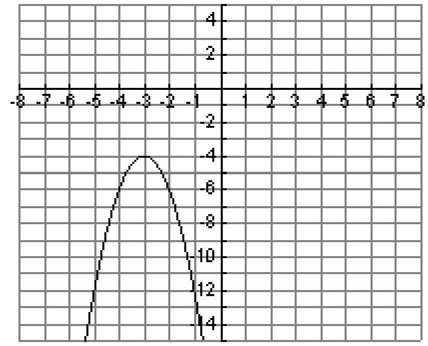
(a) $f(x) = 2(x+3)^2 - 4$ (b) $f(x) = -2(x+3)^2 - 4$ (c) $f(x) = 2(x-3)^2 + 4$

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

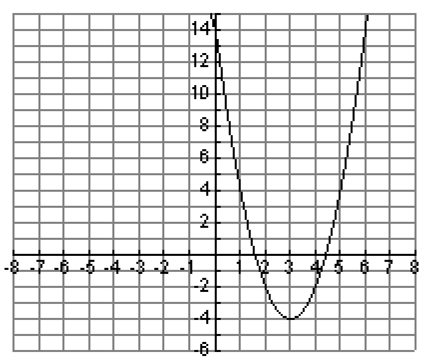
(i) e



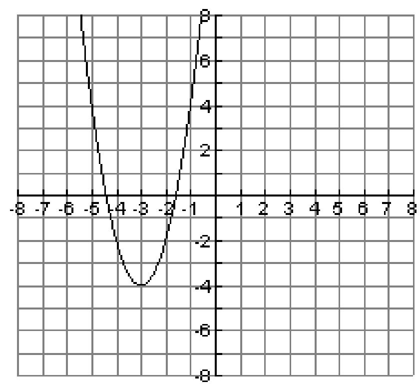
(ii) b



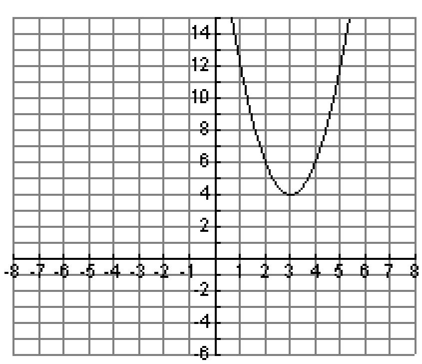
(iii) f



(iv) a



(v) c



(vi) d