MA 103 More about Quadratic Functions
Section 8.7

I. When a quadratic function is in standard form $f(x) = ax^2 + bx + c$, it can be put into vertex form $f(x) = a(x-h)^2 + k$ using the method of ***completing the square*** that was shown in class. You will be expected to be able to do this for quadratic functions in which $a = 1$.

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

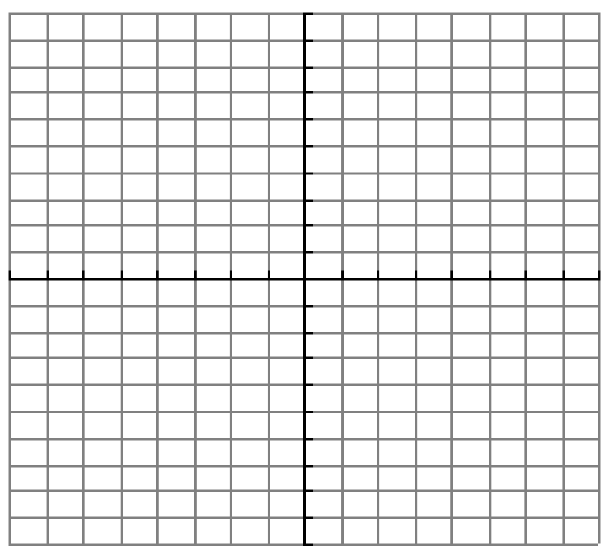
(a) Complete the square to put this function into vertex form

(b) State the direction of opening.

(c) State the coordinates of the vertex.

(d) Find the y-intercept.

(e) Sketch the graph. **DO NOT USE YOUR CALCULATOR.**



(f) State the domain

(g) State the range

II. A quadratic function in standard form $y = f(x) = ax^2 + bx + c$, where a, b, and c are real numbers and $a \neq 0$ is always a parabola which opens upward if a > 0 and downward if a < 0.

The **vertex** or turning point of the parabola occurs when $x = -\frac{b}{2a}$ and $y = f(-\frac{b}{2a})$.

The **axis of symmetry** is the vertical line through the vertex. Its equation is $x = -\frac{b}{2a}$.

The **y-intercept** occurs when x = 0. To find it, substitute x = 0 into the equation and find the corresponding value of y.

The x-**intercepts** occur when y = 0. To find the x-intercepts, set $y = f(x) = ax^2 + bx + c = 0$ and solve for x by factoring or by using the quadratic formula.

2. $f(x) = 2x^2 - 5x - 3$

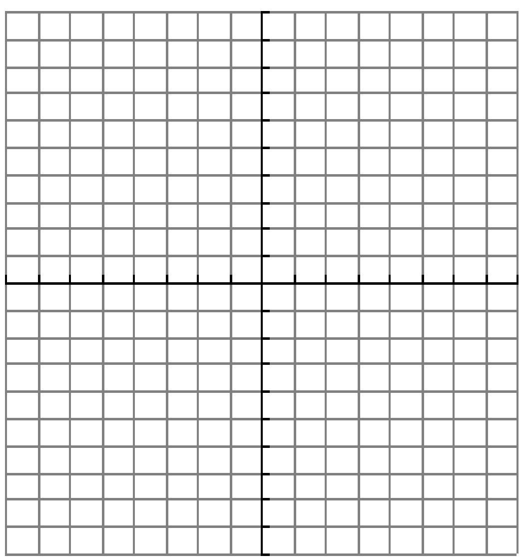
(a) Find the coordinates of the vertex.

(b) State the direction of opening .

(c) Find the y-intercept.

(d) Find the x-intercepts

(e) Sketch the graph



f) State whether the function has a maximum or a minimum value and find that maximum or minimum.

3. $h(x) = -3x^2 + 18x + 11$

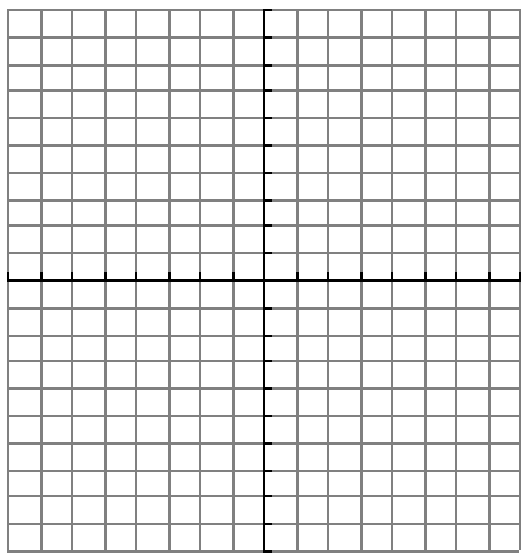
(a) Find the coordinates of the vertex.

(b) State the direction of opening .

(c) Find the y-intercept.

(d) Find the x-intercepts

(e) Sketch the graph.



(f) State whether the function has a maximum or a minimum value and find that maximum or minimum.