MCR 3UI Quadratic Functions Worksheet #1 Date: ________________________

1. Determine the maximum or minimum value of each quadratic function.
   a) $f(x) = x^2 - 6x + 2$ b) $f(x) = 2(x-4)(x+6)$

2. Graph each function.
   a) $f(x) = -3(x-2)^2 + 5$ b) $f(x) = 2(x+4)(x-6)$
   i) For each function, state the vertex, the equation of the axis of symmetry, and the domain and range.
   ii) Express each function in standard form.

3. The sum of two numbers is 16. What is the largest possible product between these numbers?

4. Graph $f(x) = -\sqrt{x+3}$ and determine
   a) the domain and range of $f(x)$.
   b) the equation of f^{-1}

5. a) Determine the equation of the inverse of the quadratic function $f(x) = x^2 - 4x + 3$.
   b) State the domain and range of $f(x)$ and its inverse.
   c) Sketch the graphs of $f(x)$ and its inverse.

6. The revenue for a business is modelled by the function $R(x) = -2.8(x-10)^2 + 15$,
   where *x* is the number of items sold, in thousands, and $R(x)$ is the revenue in thousands of dollars.
   a) Express the number sold in terms of the revenue.
   b) Almost all linear functions have an inverse that is a function, but quadratic functions do not. Explain why.

7. The profit function for a business is given by the equation $P(x) = -4x^2 + 16x - 7$,
   where *x* is the number of items sold, in thousands, and $P(x)$ is dollars in thousands.
   Calculate the maximum profit and how many items must be sold to achieve it.

8. The cost per hour of running an assembly line in a manufacturing plant is a function of the number of items produced per hour. The cost function is $C(x) = 0.3x^2 - 1.2x + 2$,
   where $C(x)$ is the cost per hour in thousands of dollars,
   and *x* is the number of items produced per hour, in thousands. Determine the most economical production level.