Quadratic Functions- Translations

1. Which of the following relations below are quadratic functions:

   a) $y = x^2 - 2x + 3$ b) $y = x^3 + 2x - 1$

   c) $y = \frac{1}{x+1}$ d) $y = \frac{1}{x^2}$

   e) $y = \sqrt{x} + 2$ f) $y = \frac{1}{4}x^2$

2. Sketch the graph for each of the following parabola without a calculator (label vertex and the coordinates of two other points) and then state:

   a) equation of axis of symmetry
   b) direction of opening
   c) the maximum or minimum value
   d) exact values of the x-intercept(s) (if any) and the y-intercept
   e) the domain and range

   i) $y = x^2 - 4$
   ii) $y = x^2 + 2$
   iii) $y = (x-2)^2 + 1$
   iv) $y = (x+1)^2 - 2$
   v) $y = (x+3)^2$
   vi) $y = -(x-1)^2$
   vii) $y = -(x+3)^2 + 1$
   viii) $y = -(x-1)^2 - 3$

3. Write the new equation of the parabola $y = x^2$ after the following:

   a) a horizontal translation 4 units to the left and a vertical translation 2 units down

   b) a horizontal translation 2 units right and a vertical translation 3 units up

   c) the parabola opens downwards and translated 3 units up

d) the parabola opens downwards and is translated 4 units right

4. If the point (3 , 9) is on the parabola $y = x^2$, what would the coordinates of this point become:

a) if the parabola was shifted up three units and left 2 units?

b) if the parabola was shifted down 1 unit and right 5 units?