Worksheet #5 - Using the Quadratic Formula

In this worksheet, you will practice using the quadratic formula.

1. Write down the quadratic formula for solving $ax^2 + bx + c = 0$. What condition needs to be satisfied for the coefficients?

2. Use the quadratic formula to solve each of the following equations. Simplify your answers as much as possible.
   
   (a) $4x^2 - 8x + 3 = 0$

   (b) $x^2 - 1 = 4x$
3 The height of a ball above the ground $t$ seconds after it is thrown is $h(t) = 6 + 10t - 16t^2$. How long will it take for the ball to hit the ground? (Round your answer to the nearest hundredth of a second.)

4 The path of a cannonball is a parabola modeled by the equation $y = 0.5x - 0.002x^2 + 4$, where $x$ and $y$ are both measured in feet. In this model, the cannonball starts at the point $(0, 4)$ and travels to the right. The ground is represented by the $x$-axis. Sketch a graph of the cannonball's path, and determine the horizontal distance traveled by the ball before it hits the ground.
A company manufactures and sells Objects. If the company wants to sell $Q$ objects, it will have to set a price of $P = 300 - 2Q$ dollars.

(a) Write down a formula for the amount of revenue, $R$, the company will generate by selling $Q$ Objects. (Recall that revenue is price times quantity sold.)

(b) The fixed cost for the company is $8000$, and each Object costs the company $6$ to manufacture. Use this information to write down a formula for the company’s profit when it sells $Q$ Objects. (Recall that profit is revenue minus total cost. Also, don’t confuse cost with price!)

(c) Sketch the graph of the profit as a function of quantity sold, and determine the break-even values (i.e. the points where the profit is zero).
6. Find the value of $x$ indicated by the figure below. Round your answer to the nearest thousandth.

7. The perimeter of a square is $P$ feet, and the area is $4P$ square-feet. Find the dimensions (i.e. the length and width) of the square.