Write the best answer to each question in the box provided. Show your work.

For the first two questions, do the following:

(a) Give the variable that is changing in the problem to cause a maximum or minimum (this will be the independent variable in part (c)). Tell what this variable means in the problem.

(b) Give the domain for the variable that is changing

(c) Write down the function you are to maximize or minimize in terms of the variable that is changing.

1. You toss a ball towards a basket that is located 10 feet in front of you and 10 feet above the ground. The position of the ball at time $t$ is given by $(t, -t^2 + 8t)$, where you are at $(0,0)$ and the basket is at $(10,10)$. At what time was the ball closest to the basket?

   (a) 

   (b) 

   (c) 

2. A box is designed with a square base. It needs have a volume of 10 cubic feet. The cost of the material for the top and bottom of the box is $2 per square foot and the cost of the material for the sides of the box is $3 per square foot. How much does the most economical box cost?

   (a) 

   (b) 

   (c) 

3. Find the absolute maximum and the absolute minimum points ($x$ and $y$-values) of $x^3 - 12x + 1$ when $x$ is in the interval [0, 3].