MATH 1300-015
Section 4.6

1. A rectangular box with a square base and no top is to be made of a total of 120cm^2 of cardboard. Find the dimension of the box of mimum volume.
   (In this problem, assume that the volume is always positive.)

2. A rectangle is incribed in the region bounded by the x-axis and the parabola $y = 9 - x^2$.

   (1) Find the height and width of the rectangle of greatest *area.*

   (2) Find the height and width of the rectangle of greatest *perimeter.*

   (3) Does the rectangle of greatest area have the greatest perimeter?

3. Two posts, one 12 feet high and the other 28 feet high, stand 30 feet apart. They are to be stayed by two wires, attached to a single stake, running from ground level to the top of each other post. Where should the stake be placed to use the least amount of wire?

4. Four feet of wire is used to form a square and a circle. How much of the wire should be used for the square and how much should be used for the circle to enclose the maximum total area?

5. A photographer is taking a picture of a four-foot painting hung in an art gallery. The camera lense is 1 foot below the lower edge of the painting, as shown in the below figure. How far should the camera be from the painting to maximize the angle subtended by the camera lens?

(Use the trigonometric formula $\tan(\theta - \alpha) = \dfrac{\tan\theta - \tan\alpha}{1 + \tan\theta\tan\alpha}$.)