Min-Max Word Problems

1) Find two numbers $x \geq 1$ and $y \geq 1$ such that $xy = 50$ and $2x + y$ is a maximum.

2) A rectangular box which is open at the top can be made from a 10 by 12 inch piece of metal by cutting a square from each corner and bending up the sides. Find the dimensions of the box with greatest volume.

3) A wire of length L is to be divided into two parts; one part will be bent into a square and the other into a circle. How should the wire be divided to make the sum of the areas of the square and circle as large as possible? As small as possible?

4) **A Norman window has the shape of a rectangle surmounted by a semicircle.**

a) Find the dimensions of the Norman window with perimeter 30 ft that admits the greatest amount of light

b) Do the same problem if the top of the window is made of frosted glass that only admits half as much light as the bottom part