Math 1510 Tutorial #8

1. Find the absolute minimum and absolute maximum values of $f(x) = 2x^3 + 3x^2 - 36x$ on the interval $[0, 3]$.

2. One vertex of a rectangle is on the curve $y = \dfrac{1}{1+x^2}$, $x \geq 0$, the opposite vertex is at the origin and one side of the rectangle is parallel to the x-axis. Find maximum area of such a rectangle if all lengths are measured in centimeters.

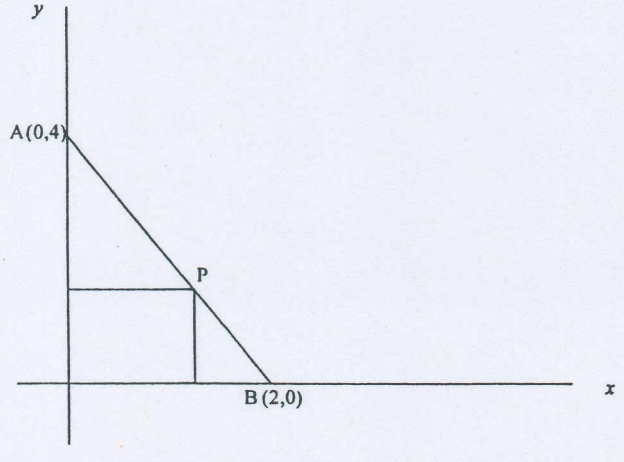
3. **A window has perimeter 10 m and is in the shape of a rectangle with top edge replaced by a semicircle. Suppose that we want to find the dimensions of the rectangle so that the window admits the greatest amount of light?**

   (a) Set up a function that needs to be maximized. State it in terms of only one variable.

   (b) Over what domain should this function be maximized?

   DO NOT PROCEED ANY FURTHER IN ATTEMPTING TO SOLVE THIS PROBLEM (the set-up is all that is required).

4. Find a function which will yield the area of the inscribed rectangle, drawn below. The rectangle is in the first quadrant with three vertices on the axis and the last vertex, P, on the line joining the points A and B.
   State your function in terms of only one variable along with its domain.
   [THIS IS ALL THAT IS REQUIRED. DO NOT PROCEED ANY FUTHER IN ATTEMPTING TO SOLVE THIS PROBLEM.]



5. A rectangular box with square base and top is to be made to contain 1250 cm^3. The material for the base costs 30 cents per cm^2, for the top 15 cents per cm^2, and the sides 20 cents per cm^2. Find a function which will yield the dimensions that will minimize the costs of this box.

   State your function in terms of only one variable along with its domain.
   THIS IS ALL THAT IS REQUIRED. DO NOT PROCEED ANY FUTHER IN ATTEMPTING TO SOLVE THIS PROBLEM.]