HW64: Optimization WKST (4.7)

1. Determine the maximum product of two positive numbers whose sum is 8.

2. Determine the maximum area of a rectangle that can be enclosed with 200 meters of fence.

3. Determine the minimum area of a poster that will contain 50 square inches of printed material and have 4 inch margins on the top and bottom and 2 inch margins on the left and right.

4. Determine the dimensions of a box of maximum volume that can be made from a piece of material 8" x 10". The box is to be made by cutting square pieces from the corners and folding up the sides. The box will not have a top.

5. Determine the maximum area of a rectangle with one side on the x-axis and the opposite corners touching the parabola $y = -x^2 + 9$.

6. A rectangle is to be inscribed in a right triangle having sides 6 inches, 8 inches and 10 inches. Determine the dimensions of the rectangle with greatest area.

7. Given a length of string L = 50 inches, construct a circle and a square such that the sum of the areas is a maximum.

8. This is the infamous *Question 6* on the 1982 A.P. Exam which was the focus of the movie, *Stand and Deliver*:

   A tank with a rectangular base and rectangular sides is to be open at the top. It is to be constructed so that its width is 4 meters and its volume is 36 cubic meters. If building the tank costs $10 per square meter for the base and $5 per square meter for the sides, what is the cost of the least expensive tank?

Answers:

1) 4 x 4 = 16

2)50 x 50 = 2500m²

3) 9 x 18 = 162 in²

4)5” x 7” x 1.5”

5) $12\sqrt{3}$

6) 3” x 4”

7) Circle radius = $\frac{25}{4+\pi}$”; square side length = $\frac{25}{2}-\frac{\pi}{2}\left(\frac{25}{4+\pi}\right)$

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