Optimisation – Answers

For questions 1 – 8 solve the optimisation problems.

1. Find two positive numbers whose sum is 300 and whose product is a maximum.

$x=150\ y=150$

2. Find two positive numbers whose product is 750 and for which the sum of one and 10 times the other is a minimum.

$X = 50\sqrt{3}\ y = 5\sqrt{3}$

3. Let x and y be two positive numbers such that $x+2y = 50$ and $(x+1)(y+2)$ is a maximum.

$x = \frac{53}{2}\ y = \frac{47}{4}$

4. We are going to fence in a rectangular field. If we look at the field from above the cost of the vertical sides are \$10/ft, the cost of the bottom is \$2/ft and the cost of the top is \$7/ft. If we have \$700 determine the dimensions of the field that will maximize the enclosed area.

$x = \frac{350}{9}\ y = \frac{35}{2}$

5. We have 45 m^2 of material to build a box with a square base and no top. Determine the dimensions of the box that will maximize the enclosed volume.

$l = w = 3.8730\ h = 1.9365$

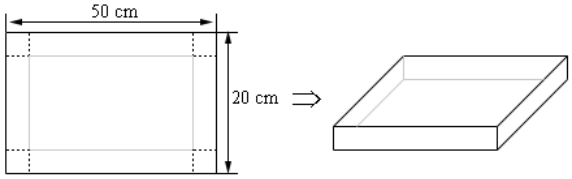
6. We want to build a box whose base length is 6 times the base width and the box will enclose 20 in^3. The cost of the material of the sides is \$3/in^2 and the cost of the top and bottom is \$15/in^2. Determine the dimensions of the box that will minimize the cost.

$w = 0.7299\ l = 4.3794\ h = 6.2568$

7. We want to construct a cylindrical can with a bottom but no top that will have a volume of 30 cm^3. Determine the dimensions of the can that will minimize the amount of material needed to construct the can.

$r = 2.1216\ h = 2.1215$

8. We have a piece of cardboard that is 50 cm by 20 cm and we are going to cut out the corners and fold up the sides to form a box. Determine the height of the box that will give a maximum volume.



$h = 4.4018$