



Optimization Self-TEST 2020

Give these a try without assistance if you can do them on your own you are amazing!

1. A woman wants to construct a box whose base length is twice the base width. The material to build the top and bottom is $\$9/\text{m}^2$ and the material to build the sides is $\$6/\text{m}^2$. If the woman wants the box to have a volume of 70 m^3 , determine the dimensions of the box (in meters) that will minimize the cost of production.

Answer: Width=2.6m

2. Find two numbers whose sum is 23 and whose product is a maximum.

Answer: $x=y=11.5$

3. What is the maximum area of a rectangular window with semicircle caps (**top and bottom**) if the perimeter of the window is 30 feet.

Answer: $225/\pi$ square feet.

4. Find the point on the line $y = 4x + 7$ that is closest to the point $(0, 0)$.

Answer: $(-28/17, 7/17)$.

5. A pipeline costing $\$40,000$ per km over land and $\$50,000$ per km underwater is to join an oil refinery on the east bank of a north flowing river 2 km wide to oil storage tanks 3km further south on the west bank. What is the least possible cost?

$x = 8/3$

6. When 30 orange trees are planted on an acre, each will produce 500 oranges a year. For every additional orange tree planted, each tree will produce 10 fewer oranges. How many trees should be planted to maximize the yield?

10 more trees than 30 should be planted – 40 trees total

BONUS: ONLY do if you have extra-time.

WORKBOOK Questions: Pg. 219 #1,2 Pg. 220 Ex. 2 Pg. 221 #1,2 Pg. 222 #3 Pg. 224-225