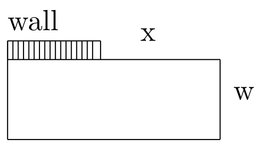
Section 4.7: Additional Problems Solutions

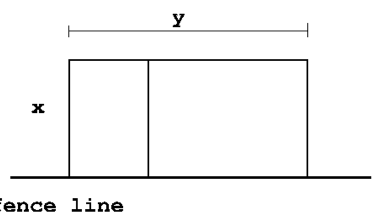
1. $A = (x + 50)w$ with $2x + 50 + 2w = 500$
   maximize $A = 275w - w^2$

   answer: $w = 137.5$feet and $x = 87.5$ feet

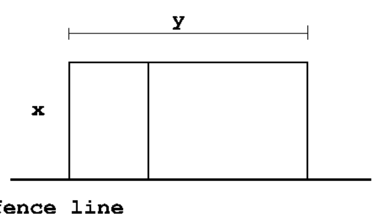
   

2. $A = x(y)$ and $3x + y = 645$
   $A = x(645 - 3x)$

   Answer: $x = 107.5$ feet and $y = 322.5$ feet

3. $C = 10 * 3x + 10 * y$ and $xy = 21675$
   $C = 30x + \dfrac{216750}{x}$
   answer: $x = 85$ feet and $y = 255$ feet

4. $C = 10 * (2x + 2y) + 6 * (2x + y) = 32x + 26y$ and $xy = 832$

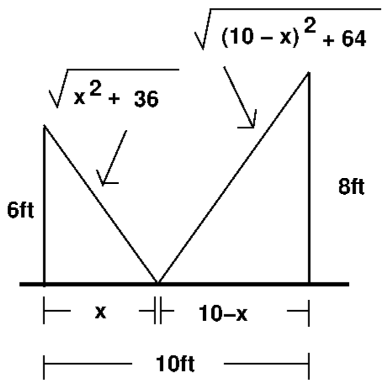
   Answer: $x = 26$feet and $y = 32$feet

5. x = length of one of the sides of the base
   h = height of the box.

   $C = 7 * x^2 + 3 * (4 * xh + x^2) = 10x^2 + 12x * h$ and $x^2h = 45$

   $C = 10x^2 + \dfrac{540}{x}$
   answer: $x = 3$ feet and $h = 5$ feet

6. Here is the picture for this problem. Let L be the length of the cable.

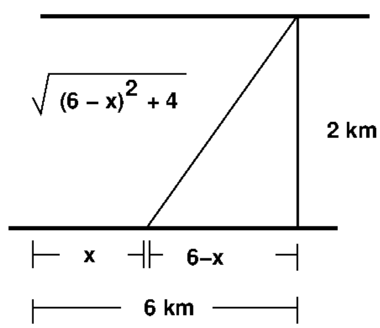


$L = \sqrt{x^2 + 36} + \sqrt{(10 - x)^2 + 64}$

Taking a derivative and solving $L' = 0$ gives $x = \frac{30}{7}$

With a first derivative sign chart, you can show that this value is a local min.

7. Here is the picture for this problem. Let C be the total cost of the pipeline.

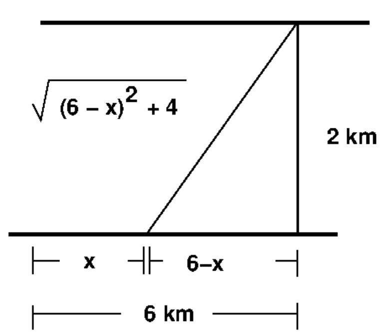


$C = 400,000x + 800,000\sqrt{(6 - x)^2 + 4}$

Taking a derivative and solving $C' = 0$ gives $x = \frac{2(9-\sqrt{3})}{3} = 4.845$ km

With a first derivative sign chart, you can show that this value is a local min.

8. Here is the picture for this problem. Let T be the total time spent on each section of the path. Remember that distance = rate * time so $t = \frac{d}{r}$



$T = \frac{x}{5} + \frac{\sqrt{(6 - x)^2 + 4}}{3}$

Taking a derivative and solving $T' = 0$ gives $x = \frac{9}{2} = 4.5$ mi

With a first derivative sign chart, you can show that this value is a local min.