Mat 011 - Agenda - Day 22 - June 24, 2004

• Review for Test 4

• Homework: Topic 35: p. 342
The cost of producing x thousand light bulbs per week is 
\[ C = 0.5x^2 - 14x + 120. \]

The revenue from selling x thousand light bulbs per week is 
\[ R = 12x - 0.5x^2. \]

Find the equation for Profit:

\[
P = (12x - 0.5x^2) - (0.5x^2 - 14x + 120)
\]

\[
P = 12x - 0.5x^2 - 0.5x^2 + 14x - 120
\]

\[
P = -1x^2 + 26x - 120
\]
\[ P = -1x^2 + 26x - 120 \]

1. \[ x = -\frac{b}{2a} = -\frac{26}{2(-1)} = 13 \]

\[ P = -1(169) + 24(13) - 120 = 49 \]

2. \( x\)-intercepts

\[ 0 = -1x^2 + 26x - 120 \]

\[ x = \frac{-26 \pm \sqrt{676 - 4(-1)(-120)}}{2(-1)} = \frac{-26 \pm \sqrt{196}}{-2} = \frac{-26 \pm 14}{-2} \]

\[ x = 14 \text{ or } x = 2 \]

3. \( y\)-intercept

\[ (0, -120) \]

\[ \frac{-26 + 14}{-2} = \frac{-12}{-2} = 6 \]

\[ \frac{-26 - 14}{-2} = \frac{-40}{-2} = 20 \]
A farmer wants to enclose adjacent rectangular fields with 1000 feet of barbed wire fencing as indicated below. Find the equation for the area of the fields.

\[
\begin{align*}
W & | L & A \\
50 & | \frac{1000-3(50)}{2} = \frac{850}{2} = 425 & 21,250 \\
100 & | \frac{1000-3(100)}{2} = \frac{700}{2} = 350 & 35,000 \\
150 & | \frac{1000-3(150)}{2} = \frac{500}{2} = 275 & 41,250 \\
\end{align*}
\]

\[
W \left(500 - 1.5W\right) \quad A = \frac{W(1000-3W)}{2} \\
W \left(500 - 1.5W\right) \quad A = \frac{1000W - 3W^2}{2}
\]
\[ A = -1.5w^2 + 500w \]

1. \( a = -1.5 \) 
   \( b = 500 \) 
   \( c = 0 \)

2. \( \text{Vertex: } x = \frac{-b}{2a} = \frac{-500}{2(-1.5)} = 166.67 \)
   
   \[ A = -1.5(2777.88)^2 + 500(166.67) = 41,666.33 + 83,335 = 124,999.33 \text{ sq ft} \]

3. \( \text{x-intercepts} \)
   
   \[ A = -1.5w^2 + 500w \]
   
   \[ 0 = 5w(-.3w + 100) \]
   
   \( 5w = 0 \) \( \text{or} \) \( -.3w + 100 = 0 \)
   
   \( w = 0 \) \( \text{ or } \) \( .3w = 100 \)
   
   \( w = 333.3 \)
<table>
<thead>
<tr>
<th>( x )</th>
<th>( A )</th>
</tr>
</thead>
<tbody>
<tr>
<td>166.7</td>
<td>41,666.7</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>333.3</td>
<td>0</td>
</tr>
</tbody>
</table>

\[ A = -1.5w^2 + 500w \]
\[ A = \omega (500 - 1.5\omega) \]
\[ A = 500\omega - 1.5\omega^2 \]
\[ A = -1.5\omega^2 + 500\omega \]
\[ A = \frac{1000 \ w - 3w^2}{2} \]

\[ A = \frac{-3w^2 + 1000 \ w}{2} \]

\[ A = \frac{-3w^2 + 500 \ w}{2} \]
State the quadratic formula.
State the formula for the x coordinate of the vertex.
Graph the Profit Equation

\[ P = -2x^2 + 28x - 50 \]

When \( P = 30 \), what is \( x \)?

\[ P = -2x^2 + 28x - 50 \]
\[ P = -2x^2 + 28x - 50 \]

\[ 30 = -2x^2 + 28x - 50 \]

\[ 0 = -2x^2 + 28x - 80 \]

\[ 0 = -2(x^2 - 14x + 40) \]
\[ 1, 40 \]

\[ 0 = -2(x - 10)(x - 4) \]
\[ 2, 20 \]

\[ x - 10 = 0 \quad \text{or} \quad x - 4 = 0 \]
\[ x = 10 \quad x = 4 \]

\[ x = \frac{-28 \pm \sqrt{784 - 4(8)(-80)}}{2(-2)} \]
\[ = \frac{-28 \pm \sqrt{784 - 640}}{-4} \]
\[ = \frac{-28 \pm \sqrt{144}}{-4} \]
\[ = \frac{-28 \pm 12}{-4} \]
\[ = \frac{-28 + 12}{-4} = 4 \]
\[ = \frac{-28 - 12}{-4} = 10 \]
Simplify:

\[ 5(2x^2 - x + 1) - 3(6x^2 - 7x + 2) \]

\[ 10x^2 - 5x + 5 - 18x^2 + 21x - 6 \]

\[ -8x^2 + 16x - 1 \]
Multiply:

$(2x-1)(x+5)$

$2x^2 + 10x - 1x - 5$

$2x^2 + 9x - 5$
Multiply: \((x-3)^2\)

\[(x-3)(x-3)\]

\[x^2 - 3x - 3x + 9\]

\[x^2 - 6x + 9\]
\[ x^2 + 25 = \text{nonfactorable over reals} \]

\[ (x - 3)(x + 3) \]

\[ x^2 + 3x - 3x - 9 \]

\[ x^2 - 9 \]

\[ \frac{x^2 - 9}{(x + 3)(x - 3)} \]

\[ x^2 - 25 = (x + 5)(x - 5) \]
Factor: \( 9x^2 + 6x \)

\[
3 \cdot 3 \cdot x \cdot x + 3 \cdot 2 \cdot x \\
3x(x + 2) \\
\]

\[
3xy + 2y^2, \quad 3xy(3x + 2y) .
\]
Factor: $x^2 - 2x - 15$

$(x + 3)(x - 5)$

$1, 15$

$3, 5$
Herb’s Company need to make a profit of $30. Graph and find where the lines intersect.
3. A farmer wants to enclose a rectangular chicken coop with 600 feet of chicken wire. The farmer will use the barn as one of the sides of the chicken coop.

Find the equation for the area of the chicken coops. Start by making a table.

<table>
<thead>
<tr>
<th>Width</th>
<th>Length</th>
<th>Area</th>
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<tbody>
<tr>
<td>50</td>
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<tr>
<td>X</td>
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</tbody>
</table>
\[ A = \frac{1}{2} b \cdot h \]

\begin{array}{c|c|c}
 \hline
 b & h & A = \frac{1}{2} b \cdot h \\
 \hline
 2 & 10 - 2 & 8 \text{ sq cm} \\
 4 & 10 - 4 & 12 \text{ sq cm} \\
 6 & 10 - 6 & 12 \text{ sq cm} \\
 \hline
 \end{array}

\[ A = \frac{1}{2} (10 - b) \cdot h \]

\[ A = \frac{1}{2} (10 b - b^2) \]

\[ A = 5b - \frac{1}{2} b^2 \]

\[ A = -\frac{1}{2} b^2 + 5b \]

\[ b = 10 \]

\[ 10 - b \]
\[ 5(b)(10-b) = 5b - 5b^2 \]

\[ 5(10b-b^2) = 5b - 5b^2 \]
\[ A = -0.5t^2 + 5t \]
\[ A = -0.5 \times x^2 + 5 \times x \]
\[ -0.5(25) + 25 = -12.5 + 25 \]
\[ x = \frac{-5}{2(-0.5)} = 5 \]
\[ A = W(500 - W) \]
\[ A = 500W - W^2 \]

1000 ft fencing

\[ L = \frac{1000 - 2W}{2} = 500 - W \]
\[ A = -w^2 + 500w \]

\[ w = \frac{-500 \pm \sqrt{62,500 + 500(2,500)}}{2 \cdot (-1)} = 250 \]  

\[ a = -1 \]

\[ b = 500 \]

\[ c = 6 \]  

\[ A = 62,500 \]
Brighten Up Company makes overhead projectors. The cost of making $x$ projectors per month is

$$C = 0.3x^2 - 65x + 800$$

and the revenue from selling $x$ projectors per month is

$$R = -0.7x^2 + 25x.$$ 

$$P = R - C$$

$C$ and $R$ are in hundreds of dollars.

$$-0.7x^2 + 25x - (0.3x^2 - 65x + 800)$$

$$P = -1x^2 + 90x - 800$$
Vertex:
Meaning:

X intercepts:
Meaning:
P intercept:
Meaning:
5. A cannon ball is shot straight up into the air. The height of the cannon ball is given by the equation

\[ h = -16t^2 + 480t \]  (h is in feet and t is in seconds)

The graph of the equation is given below.
a. When will the height of the cannon ball be 2000 feet?
   (Hint: you must use algebra to find the points of
   intersection.)

b. Graph the line $h = 2000$ on the graph above and label
   the points of intersection.
6. Simplify: \[4(3x^2 - 7x + 5) - 3(5x^2 + x - 6)\]
7. Multiply.
   a. \((2x - 5)(4x - 1)\)
8. Factor.
   a. $16x^2 - 2x$
$x^2 - x - 6$
\[ x^2 - 25 \]
Solve for $x$:

$x^2 + 10x - 11 = 0$