4/18/2006

7, 2

15
2y = 4x + 6

Q

y = 2x + 3

O

2(2x + 3) = 4x + 6

4x + 6 = 4x + 6

2 = 6

Infinite # sol.

Same line
\[
\begin{align*}
13 & \quad 3y + 2x = 4 \\
9 & \quad 3y = 6 - x \\
9 \text{ into } 1 & \\
9 & \quad (6 - x) + 2x = 4 \\
\frac{6}{2} + x &= 4 \quad -6 \\
3y &= 6 - (\cdot2) \\
3y &= 8 \\
y &= \frac{8}{3} & \quad \text{(2,} \frac{8}{3})
\end{align*}
\]
\[ \begin{align*}
0 & \quad y + 3x - 4 = 0 \\
0 & \quad 2x - y = 7 \\
0 & \quad 2x - y = 7 \\
& \quad + \quad y
\end{align*} \]

\[ 2x = 7 + y \]

\[ \frac{2x - 7}{-2} = \frac{y}{-2} \]

\[ 2x - 7 = y \]

\[ (2x - 7) + 3x - 4 = 0 \]

\[ 5x - 11 = 0 \]

\[ 5x = 11 \]

\[ x = \frac{11}{5} \]

\[ y = 2 \left( \frac{11}{5} \right) - 7 \]

\[ y = \frac{22}{5} - \frac{35}{5} \]

\[ y = -\frac{13}{5} \]
1. \[ y = -2x + 3 \]
2. \[ 4x + 2y = 12 \]

\[
4x + 2(-2x + 3) = 12 \\
4x - 4x + 6 = 12 \\
6 = 12
\]

*No Solution*

*Parallel Lines*
$3 \leq x - 7 \leq 6$

$+2 \quad +2 \quad +2$

$10 \leq x \leq 13$
7.5 Systems of Linear Inequalities

Q Solve:

1. $x + y < 4$
2. $3x + 2y \geq 6$

---

We want all ordered pairs that make BOTH true.

1. $x + y = 4$
2. $3x + 2y = 6$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Try $(0, 0)$
- $0 < 4$ True
- $(0, 0)$ is in the solution.

Shade below.

- $0 < 6$ False
- $(0, 0)$ Not in sol., Shade above.
The solution is the region shaded both ways.
Now graph #6. Another way is use arrows to denote the side of the line to shade.
$x \geq 0$

$y \geq 0$

Quad I
A Linear Programming Problem consists of:

1) An objective function
   the function you wish to either maximize or minimize.
   Example: Maximize profit
   Minimize cost

2) A set of constraints (restrictions)
   a system of linear inequalities

Solve the problem:

1) Graph the constraints.

2) Find the corner points of the shaded region.
   From the theory of linear programming, the optimal or best solution will occur at a corner point of the shaded region (feasible set).

3) Substitute these corner points into the objective function.

4) Smallest is Min,
   Largest is Max.
Objective Function

maximize: \( P = 2x + 4y \)

Subject to the constraints

1. \( 2x + 3y \leq 12 \)
2. \( 2x + y \leq 8 \)
3. \( x \geq 0 \)
4. \( y \geq 0 \)

Constraints

1. \( 2x + 3y = 12 \)
   
   \[
   \begin{array}{c|c}
   x & y \\
   \hline
   0 & 4 \\
   6 & 0 \\
   \end{array}
   \]

2. \( 2x + y = 8 \)
   
   \[
   \begin{array}{c|c}
   x & y \\
   \hline
   0 & 8 \\
   4 & 0 \\
   \end{array}
   \]

0 \((0,10)\)

\( 0 \leq 12 \)

True

0 \leq 4

Shade Below

Shade Below
Feasible Set (region)
set of all possible set

1. \(2x + 3y = 12\)
2. \(2x + y = 8\)
3. \(2x + 3y = 12\)
4. \(-2x + y = -8\)
5. \(2x = 4\)
6. \(y = 2\)

Corner Points: \(P = 2x + 4y\)

<table>
<thead>
<tr>
<th>Point</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0,0)</td>
<td>0</td>
</tr>
<tr>
<td>(4,0)</td>
<td>8</td>
</tr>
<tr>
<td>(0,4)</td>
<td>16</td>
</tr>
<tr>
<td>(3,2)</td>
<td>14</td>
</tr>
<tr>
<td>(3,2)</td>
<td>16</td>
</tr>
</tbody>
</table>

If \(x = 0\) and \(y = 4\), then we have a maximum value of \(P = 16\)
Thursday

Worksheet 1-3, all
7:5 These assigned
7:6 7, 9, 11

15?

Thursday April 27
Test 4