Section 6.8 (Homework)

#15. \( x + y > 0 \)

Write: \( x + y = 0 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
<th>((x, y))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>((0, 0))</td>
</tr>
<tr>
<td>2</td>
<td>-2</td>
<td>((2, -2))</td>
</tr>
</tbody>
</table>

" > " Dashed line
Check point not on the line
Try \((2, 0)\): \( x + y > 0 \)
\( 2 + 0 > 0 \) true
Shade this side
#24. \( \frac{1}{3}x + \frac{3}{4}y \geq 1 \)

Write: \( \frac{1}{3}x + \frac{3}{4}y = 1 \)

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
<th>(x, y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(\frac{3}{4})</td>
<td>(0, 4/3)</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>(3, 0)</td>
</tr>
</tbody>
</table>

Note: \(0 + \frac{3}{4} \cdot \frac{4}{1} = 1\) (by 4/3)

\( \frac{1}{3}x + 0 = 1 \) (by 3)
\( x = 3 \)

"\( \geq \)" Solid line

Check (0, 0):
\[ \frac{1}{3}(0) + \frac{3}{4}(0) \geq 1 \]
0 \(\geq 1\) false

Shade other side
22. $0.1x + 0.3y \leq 0.4$

Write: $0.1x + 0.3y = 0.4$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
<th>$(x, y)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.3</td>
<td>(0, 1.3)</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>(4, 0)</td>
</tr>
</tbody>
</table>

$0.3y = 0.4 \quad y = 1.3$

$0.9x = 0.4 \quad x = 4$

"\leq" Solid line

Check $(0, 0)$:

$0.1(0) + 0.3(0) \leq 0.4$

true $0 \leq 0.4$

Shade this side
7.1 Systems of Linear Equations

A solution to a system of linear equations (also called simultaneous linear equations) is the ordered pair or pairs that satisfy all equations in the system.

A system of equations is **consistent** if there is any solution.

A system of equations is **inconsistent** if there is no solution.

A system of equations is **dependent** if there is an infinite number of solutions.
Examples: Approximate the solution to the given systems of equations by graphing. If the system does not have a single ordered pair as a solution, state whether the system is inconsistent or dependent.

1. \[3x - y = 3\]

\[3y - 4x = 6\]
\[ \begin{align*}
3x - y &= 3 \\
-y &= -3x + 3
\end{align*} \]

\[ \begin{align*}
3y - 4x &= 6 \\
3y &= 4x + 6
\end{align*} \]

\[ \begin{align*}
y_1 &= 3x - 3 \\
y_2 &= \left(\frac{4}{3}\right)x + 2
\end{align*} \]
2. \(3y - x = 4\)

\[y = \frac{1}{3}x - 4\]

\(x\)  \(y\) \(\text{(x,y)}\)
---
0  -4 \(\text{(0,-4)}\)
12  0 \(\text{(12,0)}\)

\(0 = \frac{1}{3}x - 4\)

\(4 = \frac{1}{3}x\)

Extra Info

\[y = \frac{1}{3}x - 4\]

Slope: \(\frac{\text{rise}}{\text{run}} = \frac{1}{3}\)

\(x\)-Intercept

Same slope \(\Rightarrow\) parallel

3. \(3y = x + 4\)

\[y = \frac{1}{3}x + \frac{4}{3}\]

\(x\)  \(y\) \(\text{(x,y)}\)
---
0  4/3 \(\text{(0,4/3)}\)
1  4 \(\text{(1,4)}\)

\(3y - x = 4\)

\(x\)  \(y\) \(\text{(x,y)}\)
---
0  0 \(\text{(0,0)}\)
-4  0 \(\text{(-4,0)}\)

No Solution

Inconsistent
7.2 Solving Systems of Equations by the Substitution and Addition Methods

Substitution Method (See “Procedure for Solving a System of Equations Using the Substitution Method” on p. 391)
Examples: Solve the system of equations by the substitution method. If the system does not have a single ordered pair as a solution, state whether the system is inconsistent or dependent.

1. \[ y = 5x + 7 \]
\[ y = 2x + 1 \]

Substitute into 2nd eqn.

\[ 5x + 7 = 2x + 1 \]
\[ -2x - 7 = -2x - 7 \]
\[ 3x = -6 \]
\[ x = -2 \]

Substitute into 1st eqn.
\[ y = 5(-2) + 7 = -3 \]
\[ y = -3 \]

Solution: \((x_1, y) = (-2, -3)\)

Check:
\[ y = 5x + 7 \]
\[ -3 = 5(-2) + 7 \] \(\checkmark\)
\[ y = 2x + 1 \]
\[ -3 = 2(-2) + 1 \] \(\checkmark\)
2. \( y + x = 5 \)

\[
x + y = 3 \\
x = -y + 3
\]

Substitute into 2nd eqn.

\[
y + (-y + 3) = 5
\]

\[
y - y + 3 = 5
\]

\[
3 = 5 \quad \text{false} \Rightarrow \text{inconsistent}
\]
x + 2y = 6

3. \[ y = 2x + 3 \] substitute in 1st eqn.

\[
\begin{align*}
X + 2y &= 6 \\
X + 2(2x + 3) &= 6 \\
X + 4x + 6 &= 6 \\
5x &= 0 \\
x &= 0
\end{align*}
\]

Substitute in \( y = 2x + 3 \)

\[
\begin{align*}
y &= 2(0) + 3 \\
y &= 3
\end{align*}
\]

Solution: \((x, y) = (0, 3)\)

Check:

\[
\begin{align*}
x + 2y &= 6 \\
o + 2(3) &= 6 \\
5 &= 2(0) + 3 \\
\end{align*}
\]

Homework: Section 7.1
7.2 # 7-23 odd