[1] Simplify the following expression. \( 6 - (x + 5) - 2(1 - 3x) - 2x \)

\[ 6 - x - 5 - 2 + 6x - 2x \]

Answer: \( 3x - 1 \)

[2] Solve the following equations.

(a) \( \frac{2x}{3} - 1 = \frac{x}{4} + \frac{5}{6} \) Solve for \( x \). \( \text{LCD} = 12 \)

Multiply by 12 to clear fractions

\( \frac{12}{1} \left( \frac{2x}{3} \right) - 12(1) = \frac{12}{1} \left( \frac{x}{4} \right) + \frac{12}{1} \left( \frac{5}{6} \right) \)

\( 4(2x) - 12 = 3x + 2(5) \)

\( 8x - 12 = 3x + 10 \)

\( 5x = 22 \)

\( x = \frac{22}{5} \)

Answer: \( x = \frac{22}{5} \)

(b) \( dw + 4 = 3w \) Solve for \( w \).

\( -dw \quad -dw \)

\( 4 = 3w - dw \)

\( 4 = w(3-1) \)

\( \frac{4}{3-1} = w \)

Answer: \( w = \frac{4}{3-1} \)
[3] Solve the following inequalities. Write your answers in interval notation using a single interval when possible.

(a) \(2x + 3 \geq 7\) and \(3x - 1 > 14\)

\[
2x \geq 4 \quad \text{and} \quad 3x > 15
\]

\[
x \geq 2 \quad \text{and} \quad x > 5
\]

Answer: \((5, \infty)\)

(b) \(-6 \leq 2 - 7x \leq 9\)

\[-2 \quad -2 \quad -2\]

\[-8 \leq -7x \leq 7\]

Divide by \(-7\) and switch to \(\geq\) if necessary.

\[
\frac{-8}{-7} \geq x \geq \frac{7}{-7}
\]

\[\frac{8}{7} \geq x \geq -1\]

or \[-1 \leq x \leq \frac{8}{7}\]

Answer: \([-1, \frac{8}{7}]\)

(c) \(|2x - 3| > 5|\)

Solve \(|2x - 3| = 5|\)

\[2x - 3 = -5 \quad \text{or} \quad 2x - 3 = 5\]

\[2x = -2 \quad \text{or} \quad 2x = 8\]

\[x = -1 \quad \text{or} \quad x = 4\]

Answer: \((-\infty, -1) \cup (4, \infty)\)
[4] Consider the line given by the equation $2x + 5y = 15$. 

\[ 5y = -2x + 15 \quad \rightarrow \quad y = -\frac{2x}{5} + 3 \]

* Fill in the blanks below.

(a) The $y$-intercept of the line is \((0, 3)\)

(b) The slope of a line that is parallel to the given line is \(-\frac{2}{5}\) (same)

(c) The slope of a line that is perpendicular to the given line is \(\frac{5}{2}\) (neg. recip.)

[5] Fill in the blanks to describe the line graphed below.

\[ \text{down 2} \quad \text{right 5} \]

(a) The slope of the line is \(-\frac{2}{5}\)

(b) The coordinates of the $y$-intercept are \((0, 6)\)

(c) The equation of the line is \(y = -\frac{2x}{5} + 6\) (write it in slope-intercept form)
[6] Find the $x$- and $y$-intercepts of the line with equation $4y - 3x = 24$.

$x$-int (when $y = 0$)  
$y = 0$  
$4(0) - 3x = 24$  
$-3x = 24$  
$x = -8$

$y$-int (when $x = 0$)  
$4y - 3(0) = 24$  
$4y = 24$  
$y = 6$

$x$-intercept: $(-8, 0)$  
y-intercept: $(0, 6)$

[7] Find the equation of the line passing through the points $(2, -4)$ and $(4, 2)$. Write your answer in slope-intercept form.

First find the slope:  
$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - (-4)}{4 - 2} = \frac{6}{2} = 3$

Using the point $(4, 2) \implies m = 3$  
$y - y_1 = m(x - x_1)$  
$y - 2 = 3(x - 4)$  
$y - 2 = 3x - 12$  
$y = 3x - 10$

Equation: $y = 3x - 10$

[8] Find the equation of the horizontal line passing through the point $(6, -3)$. Then give the slope of this line.

Equation: $y = -3$  
Slope: $0$
Graph the solution set of the following inequality in the provided plane.

\[ y > -\frac{2}{5}x + 4 \]

- Graph \( y = -\frac{2}{5}x + 4 \) (Gshell)
- Slope = \( -\frac{2}{5} \), \( y \)-int (0,4)

Test point (0,0)

\[ 0 > -\frac{2}{5}(0) + 4 \]
\[ 0 > 4 \text{ False} \]

(0,0) is not a solution

Shade other side of line

---

Solve the following system of equations by using the graphing method.

- \( y = 6 - 4x \) \( \rightarrow \) Slope = \( -\frac{4}{1} \), \( y \)-int (0,6)
- \( y = 2x \) \( \rightarrow \) Slope = \( \frac{2}{1} \), \( y \)-int (0,0)

Answer: (1, 2)

\[ \begin{align*}
2x - y + 3z &= 5 \\
3x + y - 2z &= 2 \\
4x + 2y - 4z &= 2
\end{align*} \]

- Eliminate \( y \): \( A + B \rightarrow 5x + z = 7 \) \( \text{(A)} \)

- Eliminate \( y \) again: \( 2A \rightarrow 4x - 2y + 6z = 10 \)
  \( C \rightarrow 4x + 2y - 4z = 2 \) Add
  \( 8x + 2z = 12 \) \( \text{(E)} \)

- Eliminate \( z \):
  \( -2D \rightarrow -10x - 2z = -14 \)
  \( E \rightarrow 8x + 2z = 12 \) Add
  \( -2x = -2 \)
  \( x = 1 \)

Find \( z \) using \( \text{(D)} \)
\[ 5(1) + z = 7 \]
\[ 5 + z = 7 \]
\[ z = 2 \]

Find \( y \) using \( \text{(B)} \)
\[ 3(1) + y - 2(2) = 2 \]
\[ 3 + y - 4 = 2 \]
\[ y - 1 = 2 \]
\[ y = 3 \]

Answer: \( (1, 3, 2) \)
[12] Do TWO of the following three application problems. CROSS OUT the problem that you do not want graded. If you fail to do so, the first two attempted problems will be graded. For each problem you must (1) define all variables and expressions, (2) set up and solve an equation (or system of equations) that will be used to complete the problem, and (3) clearly state your answer.

(a) Ryan paid a total of $12 for 4 pints of strawberries and 2 pints of blueberries. At the same store (same prices), Alyssa paid a total of $9 for 1 pint of strawberries and 3 pints of blueberries. How much (total) would Colby have to pay for 1 pint of strawberries and 1 pint of blueberries at the same store?

Let $x =$ cost of one pint of strawberries
$y =$ cost of one pint of blueberries

Ryan: $4x + 2y = 12$

Alyssa: $x + 3y = 9 \rightarrow x = 9 - 3y$

Substitute $4(9 - 3y) + 2y = 12$

$36 - 12y + 2y = 12$

$36 - 10y = 12$

$-10y = -24$

$y = 2.4$

Answer: $\$4.20$

Find $x$

$x = 9 - 3y$

$= 9 - 3(2.4)$

$= 9 - 7.2$

Colby

$x = 1.8$

We want $x + y = 1.8 + 2.4 = 4.2$
(b) Jim drives his car an average of 10 mph faster than his wife drives her car. If it takes Jim 3 hours to get to his sister’s house and it takes his wife 4 hours to get to his sister’s house (taking the same route), how fast does Jim drive on average?

<table>
<thead>
<tr>
<th></th>
<th>Jim</th>
<th>Wife</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>3(x+10)</td>
<td>x+10</td>
</tr>
<tr>
<td>T</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

They both travel the same distance

3(x+10) = 4x

3x + 30 = 4x

x = 30  
Wife's rate

x + 10 = 40  
Jim's rate

Answer  40 mph

(c) A chemist wishes to make 10 L of a 12% acid solution by mixing a 10% acid solution and a 15% acid solution. How many liters of each should the chemist use?

\[
\begin{align*}
\text{10%} & \quad + \quad \text{15%} \\
x \quad & \quad 10-x \\
\text{12%} & = 10
\end{align*}
\]

\[
0.10x + 0.15(10-x) = 0.12(10)
\]

multiply by 10

10x + 15(10-x) = 120

10x + 150 - 15x = 120

-5x + 150 = 120

-5x = -30

x = 6

10 - x = 4

# of liters of 10% solution: 6  
# of liters of 15% solution: 4