PART I QUESTIONS: Show all of your work.

1. Which of the following is the $x$-coordinate of the solution to the system shown below?

$$2x + 3y = 18$$
$$4x - 3y = 12$$

$$\begin{align*}
x & = \frac{30}{6} \\
& = 5
\end{align*}$$

2. The line $y = 3x + 2$ is graphed. **Graph the other line $y = -x + 6$** Which of the following would be the $y$-coordinate of the solution when both lines are graphed?

$$y = 4$$

3. Which of the following equations would have a solution that is the same as the solution to the system?

$$5x - 3y = -8$$

$$\begin{align*}
x & = 6 \\
y & = 2
\end{align*}$$

4. Is $(4, 8)$ a solution to the system of equations?

$$\begin{align*}
y & = 5x - 12 \\
y & = -3x + 20
\end{align*}$$

$$(8) = 5(4) - 12 \quad (8) = -3(4) + 20$$

$$(8) = 20 - 12 \quad (8) = -12 + 20$$

$$(8) = 8 \quad (8) = 8$$

Both are True. So, $(4, 8)$ is a solution to this system.
5. The quadratic functions \( f(x) = -x^2 + 8 \) and \( g(x) = \frac{1}{3}x - 2 \) are shown.

The positive solution to \( f(x) = g(x) \) is which of the following.

Write a solution.

\[
\begin{array}{c|c|c}
X & f(x) & X \quad g(x) \\
-3 & -1 & -3 \quad -3 \\
-1 & 7 & 0 \quad -2 \\
1 & 7 & 3 \quad -1 \\
3 & -1 & 6 \quad 0 \\
\end{array}
\]

6. Which of the following points is a solution to the system of inequalities shown graphed below?

\( y < \frac{1}{4}x - 2 \)

\( y \geq -3x + 8 \)

\( \left( \frac{7}{4}, \frac{7}{4} \right) \)

Is this point in the shaded region?

Yes

7. Which of the following is the value of \( y \) that solves the system of equations shown below?

\[
\begin{align*}
5x + 6y &= 51 \\
y &= 2x
\end{align*}
\]

\[
\begin{align*}
5x + 6(2x) &= 51 \\
5x + 12x &= 51 \\
17x &= 51 \\
x &= \frac{51}{17}
\end{align*}
\]

\[
\begin{align*}
y &= 2(3) \\
y &= 6 \\
(3, 6)
\end{align*}
\]

8. At what point do the lines \( y = 2x - 3 \) and \( y = -2x + 3 \) intersect? Show Mr. V the calculator.

\[
\begin{align*}
2x - 3 &= -2x + 3 \\
2x + 2x &= \text{ } 3 + 2x \\
4x - 5 &= 3 \\
4x &= 8 \\
x &= \frac{8}{4}
\end{align*}
\]

\[
\begin{align*}
y &= 2x - 5 \\
y &= 2(2) - 5 \\
y &= 4 - 5 \\
y &= -1
\end{align*}
\]

\[
\begin{align*}
&x = 2 \\
y &= -1
\end{align*}
\]

\[
(2, -1)
\]
9. Find the value of $x$ that solves the system shown below. Show the work that leads to your answer.

- $y = 3x$ and $2x + y = -30$
- $y = 3(-6)$
- $y = -18$
- $2x + (3x) = -30$
- $5x = -30$
- $x = -6$

The point $(-6, -18)$ is the solution.

$x = -6$ is the $x$-value of the solution.

10. Graph the system of equations.

$y = \frac{-2}{3}x + 1$ and $y = \frac{1}{2}x - 6$

11. What is the solution to #10?

Intersection of the lines $(6, -3)$

12. Solve the following system of equations algebraically. Find the solution.

$(6, -5)$

- $5x + 2y = 20$
- $5(6) + 2y = 20$
- $30 + 2y = 20$
- $2y = -10$
- $y = -5$

- $5x + 2y = 20$
- $-2y - x = 4$
- $4x = 24$
- $x = 6$

$y = -5$
13. Sketch the graph to the system of inequalities shown below. Explain how to shade.

\[ y > 4x - 8 \quad \text{and} \quad y \leq \frac{-2}{3}x + 6 \]

**Dotted**

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<th>x</th>
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<td>3</td>
<td>4</td>
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**Solid**

<table>
<thead>
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<th>x</th>
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</tr>
<tr>
<td>6</td>
<td>2</td>
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</tbody>
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**Shade Above**

14. Graph the point \((5, 1)\) Is it a solution to the system?

Yes

15. The Poughkeepsie Drama Club is selling tickets to an upcoming play. They can sell 500 tickets. The adult tickets sell for $10 each and student tickets cost $5. They would like to raise $3,000. If \(x\) represents the number of adult tickets and \(y\) represents the number of student tickets, answer the following.

Write a system of equations that models this situation.

\[
\begin{align*}
x + y &= 500 \\
10x + 5y &= 3000
\end{align*}
\]

16. A party is thrown where 20 tables are used. Each table either sits 8 people or 10 people. A total of 170 people can be sat at the tables. If \(E\) represents the number of 8 person tables and \(T\) represents the number of 10 person tables, write a system of equations that models this situation.

\[
\begin{align*}
E + T &= 20 \\
8E + 10T &= 170
\end{align*}
\]