INTERMEDIATE ALGEBRA

Part I:

1. \( \frac{10!}{6!4!} = ? \)

2. \( 3\sqrt{16} + 2\sqrt{54} = ? \)

3. Simplify \( \frac{x^2 + 4x + 3}{x^2 - 1} \).

4. Solve the system of equations.
   \[
   \begin{align*}
   2x + 3y &= 7 \\
   -x + y &= 4
   \end{align*}
   \]

5. Simplify \( |-3(2)| + 2^3 - 4|-1| \).

6. Solve \( |3 - x| \leq 12 \).

7. Solve \( 5 - \frac{x}{3} = 4x \).

8. Graph the equation \( y = 2x^2 - 1 \).

9. Solve for \( x \) and graph the solution. \( 3x - 4 > 5x - 8 \)

10. For which intervals is the statement \( 5 - \frac{x}{4} > x \) true?

Intermediate Algebra Part II:

1. \( \frac{12!}{5!8!} = ? \)  
   a) 99  b) 20  c) 11,880  d) 495

2. \( -4\sqrt{8} + 6\sqrt{18} = ? \)  
   a) \( 2\sqrt{10} \)  b) 286  c) 10\( \sqrt{2} \)  d) 12\( \sqrt{2} \)

3. Simplify \( \frac{x^2 - 2x - 24}{x^2 + 10x + 24} \), \( x \neq -4 \).
   a) \( \frac{-2x - 24}{10x + 24} \)  b) \( -\frac{1}{5} \)  c) \( \frac{x - 6}{x + 6} \)  d) -1

4. Solve the system of equations.
   \[
   \begin{align*}
   5x + 3y &= 8 \\
   x + 6y &= 7
   \end{align*}
   \]
   a) \( \left( \frac{8}{5}, \frac{7}{6} \right) \)  b) \( (1, 1) \)  c) \( (1, -1) \)  d) \( \left( \frac{29}{15}, -\frac{5}{9} \right) \)
5. Simplify \(-2|\ -2 + 6| - 4^2 + |-3|
\begin{align*}
a) & -21 \\
b) & 11 \\
c) & -27 \\
d) & 21 \\
\end{align*}

6. Solve \(|x + 7| > 3
\begin{align*}
a) & x > -4 \text{ or } x < -10 \\
b) & 3 < x < 3 \\
c) & -11 < x < -7 \\
d) & x < -4 \text{ and } x > -10 \\
\end{align*}

7. Solve \(\frac{3x}{2} - \frac{x}{3} = 7
\begin{align*}
a) & 1 \\
b) & -7/2 \\
c) & 21/6 \\
d) & 6 \\
\end{align*}

8. Pick the graph that best fits the equation \(y = 4 - x
\begin{align*}
a) & \ \\
b) & \ \\
c) & \ \\
d) & \ \\
\end{align*}

9. Solve for \(x\) and graph the solution set. \(7x - 3 \leq 2x + 12
\begin{align*}
a) & \ \\
b) & \ \\
c) & \ \\
d) & \ \\
\end{align*}

10. Which set describes the graph
\begin{align*}
a) & (-1,5) \\
b) & (-1,5) \\
c) & [-1,5] \\
d) & x < -1 \\
\end{align*}

Note: There is only one answer, but there may be several ways to obtain the answer. Only one method is given.

Solutions to Intermediate Algebra Part I.

1. Write out the factorials \(10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1\) and cancel common factors \(6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1\cdot 4 \cdot 3 \cdot 2 \cdot 1\). Multiply the remaining factors \(\frac{10 \cdot 3 \cdot 7}{3} = 210\)

2. Simplify the radicals by finding the perfect cube factors.
\(3\sqrt[3]{8} \cdot \sqrt[3]{2} + 2\sqrt[3]{27} \cdot \sqrt[3]{2}\)
Evaluate the perfect cubes. \(3 \cdot 2 \cdot \sqrt[3]{2} + 2 \cdot 3 \cdot \sqrt[3]{2}\) Simplify and combine the terms with like radicands. \(6\sqrt[3]{2} + 6\sqrt[3]{2} = 12\sqrt[3]{2}\)

3. Factor the numerator and denominator. \(\frac{(x + 3)(x + 1)}{(x + 1)(x - 1)}\) Cancel common factors \(\frac{(x + 3)}{(x - 1)} = \frac{x + 3}{x - 1}\)

4. Multiply the second equation by 2 and add it to the first equation to eliminate the \(x\)-variable.
\(2x + 3y = 7\) \(2x + 3y = 7\)
\(2(-x + y = 4)\) \(-2x + 2y = 8\)
\(5y = 15\)
Solve for \(y\), then back substitute into one of the original equations to find \(x\).
\(y = 3\)
\(2x + 3(3) = 7\)
\(2x = -2, \ x = -1\) as an ordered pair \((-1,3)\)
6. Write down both possibilities and solve them independently.

\[
\begin{align*}
3 - x & \leq 12 \\
-3 - x & \leq 12 \\
x & \geq -9 \\
x & \leq 15
\end{align*}
\]

7. Eliminate the fractions by multiplying by the lowest common denominator, 3.

\[
3 \cdot 5 - \frac{x}{3} = 3(4x)
\]
\[
15 - x = 12x
\]
\[
15 = 13x
\]
\[
x = \frac{15}{13}
\]

8. Make a list of ordered pairs, plot the points, and connect to form a parabola.

<table>
<thead>
<tr>
<th>x</th>
<th>y = 2x^2 - 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>7</td>
</tr>
<tr>
<td>-1</td>
<td>1</td>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

9. Isolate the \( x \). Remember to flip the inequality sign when multiplying or dividing by a negative number.

\[-2x > -4\]

\[x < 2\]

10. Multiply both sides by 4 to eliminate the fractions. Then isolate \( x \).

\[4 \left(5 - \frac{x}{4}\right) > 4(x)\]
\[20 - x > 4x\]
\[20 > 5x\]
\[4 > x\]

Solutions to Intermediate Algebra Part II