1. If \( f(x) = \frac{2x + 7}{x^2 - 9} \), then \( f(3) = ? \) What does your solution represent graphically?

2. Simplify the expression. Your answer should contain no parenthesis or negative exponents.
   a) \( \frac{(2x^3 y^3)^{(4x^0 y^4)^3}}{8x^7 y^{12}} \)
   b) \( \left( \frac{2x}{3} \right)^2 \)

3. Write the equation of the line perpendicular to \( y = -2x + 3 \) and passing through \((-2, -6)\)

4. Solve each equation for the indicated variable:
   a) \( 2^{4x-1} = 32 \), for \( x \)
   b) \( \frac{m - 2m}{5} = \frac{1}{5}, \) for \( m \)
   c) \( |5 - x| = 9 \)
   d) \( 4x + 1 - 2 = 10 \)
   e) \( |2x + 3| = -7 \)
   f) \( 5x + 3y = 15 \), for \( y \)
   g) \( 6 - 2(q - 3p) = 4p \), for \( p \)

5. Given the following table, identify the pattern of growth as linear or exponential. Then, write an explicit and recursive formula for the sequence:

<table>
<thead>
<tr>
<th>n</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>t(n)</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
</tbody>
</table>

6. Nancy started the year with $425 in the bank and is saving $25 a week. Seamus started the year with $875 and is spending $15 a week. Write a system of equations and find when they will have the same amount of money in the bank.

7. For each of the following, solve the system using your equal values, substitution, or elimination. Then explain what your answer represents graphically.
   a) \( x = 2y + 4 \)
   b) \( 3x + 2y = 12 \)
   \( y - 2x = 16 \)
   \( 5x - 3y = -37 \)

8. In seven years, Seta’s son Stu is leaving home for college. Seta hopes to save $8,000 to help pay for his first year. She has $5,000 now and has found a bank that pays 8% interest, compounded monthly. At this rate, will she have the money she needs for Stu’s first year of college?

9. The value of Ian’s house is represented by the function \( H(t) = 450,000(0.92)^t \), where \( H(t) \) represents the value of his house in dollars and \( t \) represents the time, in years, since he purchased the house. In the function \( H(t) \), explain what 0.92 and 450,000 represent in the context of the situation.

10. Write the equation of an exponential function passing through \((2, 4)\) and \((6, 1024)\).
11. Solve each inequality. Write your answer as an inequality and on a number line:
   a) \(2(x - 5) \leq 8\)
   b) \(12 - 3x > 2x + 1\)
   c) \(|1 - 3x| \geq 13\)
   d) \(-2|x - 3| + 6 < -4\)

12. Graph the solution to the following inequalities:
   a) \(y < -3x - 5\)
   b) \(3x + 2y \geq 7\)
   c) \(y > 2(3)^x\)

13. Graph the solution to the system:
   \[
   \begin{align*}
   y & \geq -3x - 6 \\
   y & > 4x - 4
   \end{align*}
   \]

14. Yellow Cab Taxis charges a $1.75 flat rate in addition to $0.65 per mile. Katie has no more than $10 to spend on a ride. Define a variable then write and solve an inequality to determine how far Katie can go in the taxi. Write your answer using a complete sentence.

15. Examine the graph below. What inequality will produce this graph?

16. Is \((-2, 1)\) a solution to the system of inequalities below?
   \[
   \begin{align*}
   y & \leq -\frac{1}{2}x + 3 \\
   y & \geq \frac{3}{2}x - 1
   \end{align*}
   \]

17. Using the information given in the diagrams below, decide if any triangles are congruent. If you claim the triangles are congruent, create a flowchart justifying your answer.
1. If \( f(x) = \frac{2x + 7}{x^2 - 9} \), then \( f(3) = ? \) What does your solution represent graphically?

Not possible. The graph does not have an output (y-value) when \( x = 3 \).

2. Simplify the expression. Your answer should contain no parenthesis or negative exponents.
   a) \( \frac{(2x^3 y^3)^4}{8x^7 y^{12}} \)
   b) \( \left( \frac{2x}{3} \right)^{-2} \)
   \[ 16x^0 y^5 \]
   \[ \frac{9}{4x^2} \]

3. Write the equation of the line perpendicular to \( y = -2x + 3 \) and passing through \((-2, -6)\)
   \[ y = \frac{1}{2}x - 5 \]

4. Solve each equation for the indicated variable:
   a) \( 2^{4x-1} = 32 \), for \( x \);
      \[ x = \frac{3}{2} \]
   b) \( \frac{m - 2m}{5} = \frac{1}{5} \), for \( m \);
      \[ m = -3 \]
   c) \( |5 - x| = 9 \), for \( x \);
      \[ x = -4 \text{ or } 14 \]
   d) \( |4x + 1| - 2 = 10 \), for \( x \);
      \[ x = \frac{11}{4} \text{ or } \frac{-13}{4} \]
   e) \( |2x + 3| = -7 \), for \( x \);
      \[ \text{No Solution} \]
   f) \( 5x + 3y = 15 \), for \( y \);
      \[ y = \frac{-5}{3}x + 5 \]
   g) \( 6 - 2(q - 3p) = 4p \), for \( p \);
      \[ p = q - 3 \]

5. Given the following table, identify the pattern of growth as linear or exponential. Then, write an explicit and recursive formula for the sequence:

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**Exponential**

Recursive: \( t(n + 1) = t(n) \times (2) \), \( t(0) = \frac{1}{2} \)

Explicit: \( t(n) = \frac{1}{2} \times (2)^n \)
6. Nancy started the year with $425 in the bank and is saving $25 a week. Seamus started the year with $875 and is spending $15 a week. Write a system of equations and find when they will have the same amount of money in the bank.

Let \( y = \) amount of $ in bank account and \( x = \) number of weeks

\[
\begin{align*}
y &= 425 + 25x \\
y &= 875 - 15x
\end{align*}
\]

They will have the same amount of money in the bank sometime between the 11th and 12th week.

7. For each of the following, solve the system using your equal values, substitution, or elimination. Then explain what your answer represents graphically.

a) \(2x + y = 4 \quad \quad y - 2x = 16\)

\[
\begin{array}{c}
(-12, -8)
\end{array}
\]

b) \(3x + 2y = 12 \quad 5x - 3y = -37\)

\[
\begin{array}{c}
(-2, 9)
\end{array}
\]

8. In seven years, Seta's son Stu is leaving home for college. Seta hopes to save $8,000 to help pay for his first year. She has $5,000 now and has found a bank that pays 8% interest, compounded monthly. At this rate, will she have the money she needs for Stu's first year of college?

[Yes, Seta will have approximately $8,761, which is enough.]

9. The value of Ian's home is represented by the function \(H(t) = 450,000(0.92)^t\), where \(H(t)\) represents the value of his house in dollars and \(t\) represents the time, in years, since Ian purchased his home. In the function \(H(t)\), explain what 0.92 and 450,000 represent in the context of the situation.

0.92 tells us that Ian's home is depreciating at 8% each year; $450,000 is the amount he purchased his home for.

10. Write the equation of an exponential function passing through (2, 4) and (6, 1024).

\[
y = \frac{1}{4}(4)^x
\]

11. Solve each Inequality. Write your answer as an inequality and on a number line:

a) \(2(x - 5) \leq 8; \quad x \leq 9\)

b) \(12 - 3x > 2x + 1; \quad x < \frac{11}{5}\)

c) \(|1 - 3x| \geq 13; \quad x \geq \frac{14}{3} \text{ or } x \leq -4\)

d) \(-2|x - 3| + 6 < -4; \quad x > 8 \text{ or } x < -2\)
12. Graph the solution to the following inequalities:
   a) \( y < -3x - 5 \)

   ![Graph of y < -3x - 5]

   b) \( 3x + 2y \geq 7 \)

   ![Graph of 3x + 2y \geq 7]

   c) \( y > 2(3)^x \)

   ![Graph of y > 2(3)^x]

13. Graph the solution to the system:
   \[
   \begin{align*}
   y & \geq -3x - 6 \\
   y & > 4x - 4
   \end{align*}
   \]

   ![Graph of y \geq -3x - 6 and y > 4x - 4]

14. Yellow Cab Taxis charges a $1.75 flat rate in addition to $0.65 per mile. Katie has no more than $10 to spend on a ride. Define a variable then write and solve an inequality. Write your answer using a complete sentence.

\[
1.75 + 0.65x \leq 10; \quad x \leq 12.69; \text{ Katie can go approximately 12 miles in the Taxi (but should go fewer if she wants to leave a tip)}
\]
15. Examine the graph below. What inequality will produce this graph?

\[ y > -\frac{1}{2}x - 1 \]

16. Is \((-2, 1)\) a solution to the system of inequalities below?

\[ y \leq -\frac{1}{2}x + 3 \]
\[ y \geq \frac{3}{2}x - 1 \]

Yes, the point makes both inequalities true.

17. Using the information given in the diagrams below, decide if any triangles are congruent. If you claim the triangles are congruent, create a flowchart justifying your answer.

Given

\[ \angle ABD \cong \angle BCD \]

\[ BD \cong BD \]

\[ \angle BDC \cong \angle BDA \]

Side congruent to itself

\[ \Delta ABD \cong \Delta CDB \]

Right \( \angle s \) are \( \cong \)

\[ \text{AAS} \cong \]