1. (Review) Write an equation to describe each **linear function** graphed below.

   A. 
   ![Graph A]
   
   \[ f(x) = \]
   
   B. 
   ![Graph B]
   
   \[ h(x) = \]
   
   C. 
   ![Graph C]
   
   \[ g(x) = \]

2. (Review) Write an equation to describe each **linear function** based on the provided information.

   A. The linear function, \( k(x) \), has a slope of \( \frac{3}{4} \) and a \( y \)-intercept of \( -2 \).
   
   \[ k(x) = \]

   B. The linear function, \( a(x) \), passes through the point \((5, -2)\) and has a slope of \( \frac{4}{5} \).
   
   \[ a(x) = \]

   C. The linear function, \( h(x) \), passes through the points \((3, 1)\) and \((-6, 7)\).
   
   \[ h(x) = \]

   D. The linear function, \( p(x) \), is parallel to the function \( t(x) = \frac{2}{3}x - 5 \) and passes through the point \((6, 2)\).
   
   \[ p(x) = \]
3. **(Review)** Write an equation to describe each **quadratic function** graphed below.

A. 

![Graph A](image1)

B. 

![Graph B](image2)

4. **(Review)** Write an equation to describe each **quadratic function** based on the provided information.

A. The quadratic function, \( w(x) \), has a vertex \((5, -2)\) and an \( x \)-intercept of \(3\).

\[
\text{w}(x) = \boxed{}
\]

B. The quadratic function has \( x \)-intercepts at \(-1\) and \(3\). The function also passes through the point \((2, -6)\).

\[
\text{g}(x) = \boxed{}
\]
5. (Review) Consider the **exponential function**, \( f(x) = 3^x \).
A. Fill in the missing values in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td></td>
</tr>
</tbody>
</table>

B. Plot the points from the table and sketch a graph.

6. Consider the **exponential function**, \( g(x) = 2^x - 2 \).
A. Fill in the missing values in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( g(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td></td>
</tr>
</tbody>
</table>

B. Plot the points from the table and sketch a graph.

7. Consider the **exponential function**, \( h(x) = \left(\frac{1}{2}\right)^x + 1 \).
A. Fill in the missing values in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( h(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

B. Plot the points from the table and sketch a graph.
8. Determine the asymptote and sketch a graph (label the any intercepts, points when x = 0, and when x = 1.)
   A. \( f(x) = 3^x - 4 \)
   B. \( g(x) = \left(\frac{1}{2}\right)^x + 2 \)
   C. \( h(x) = -2^x - 3 \)

9. Create two different exponential functions of the form \( f(x) = a \cdot b^x + c \) that have a horizontal asymptote at \( y = 5 \).

10. Given the function \( f(x) \) is of the form \( f(x) = a \cdot b^x + c \), has a horizontal asymptote at \( y = -1 \), and passes through the point \((0,2)\), create a possible function for \( f(x) \).

11. Consider \( t(x) \) is of the form \( t(x) = a^x + c \).

12. Consider \( w(x) \) is of the form \( w(x) = a^x + c \).

Which of the following must be true for the parameter ‘\( b \)?’

- \( a > 1 \)
- \( 0 < a < 1 \)
- \( a < 0 \)

Which of the following must be true for the parameter ‘\( c \)?’

- \( c > 0 \)
- \( c = 0 \)
- \( c < 0 \)

Which of the following must be true for the parameter ‘\( a \)?’

- \( a > 1 \)
- \( 0 < a < 1 \)
- \( a < 0 \)

Which of the following must be true for the parameter ‘\( c \)?’

- \( c > 0 \)
- \( c = 0 \)
- \( c < 0 \)
13. Determine the x-intercept and y-intercept of the following exponential functions:
   a. \( r(x) = 3 \cdot 2^x - 6 \)
   b. \( r(x) = -1 \cdot 3^x + 9 \)

14. Tell which functions below are linear, quadratic, or exponential and if it is exponential determine whether it could represent exponential growth or exponential decay.

\[
\begin{array}{c|c|c|c|c|c|c}
\hline
x  & 0   & 1   & 2   & 3   & 5  \\
\hline
h(x) & 3 & 5 & 7 & 9 & 13 \\
\hline
\end{array}
\begin{array}{c|c|c|c|c|c|c}
\hline
x  & 1   & 2   & 3   & 4   & 5  \\
\hline
j(x) & 2 & 2 & 0 & -4 & -10  \\
\hline
\end{array}
\begin{array}{c|c|c|c|c|c|c}
\hline
x  & 1   & 2   & 3   & 4   & 5  \\
\hline
k(x) & 3 & 7 & 19 & 55 & 163  \\
\hline
\end{array}
\begin{array}{c|c|c|c|c|c|c}
\hline
x  & 0   & 1   & 2   & 3   & 5  \\
\hline
m(x) & 1 & 2 & 5 & 10 & 26  \\
\hline
\end{array}
\begin{array}{c|c|c|c|c|c|c}
\hline
x  & 1   & 2   & 3   & 4   & 5  \\
\hline
n(x) & 65 & 33 & 17 & 9 & 5  \\
\hline
\end{array}
\begin{array}{c|c|c|c|c|c|c}
\hline
x  & 1   & 2   & 3   & 4   & 5  \\
\hline
p(x) & 11 & 9 & 7 & 5 & 3  \\
\hline
\end{array}
\]

\( q(x) = 4x + 2 \quad r(x) = 192 \cdot (0.5)^x + 8 \quad s(x) = 3 \cdot (1.5)^x + 2 \quad t(x) = -\frac{1}{2}x^2 + 6 \)
1. The parent graph is shown in light gray on the graph. Graph the transformed function on the same Cartesian coordinate grid and describe the transformations based on the function \( t(x) \).

a. Parent Function: \( f(x) = 2^x \)
   
   Transformed Function: \( t(x) = 2^{(x-2)} - 6 \)

b. Parent Function: \( f(x) = 2^x \)
   
   Transformed Function: \( t(x) = 2 \cdot 2^{(x-4)} \)

c. Parent Function: \( f(x) = 3^x \)
   
   Transformed Function: \( t(x) = -3^{(x+3)} \)

d. Parent Function: \( f(x) = 3^x \)
   
   Transformed Function: \( t(x) = 3^{(-x)} + 2 \)
2. Given the graph of \( f(x) \) on the left, determine an equation for \( g(x) \) on the right in terms of \( f(x) \).

a.

\[
g(x) = \]

b.

\[
g(x) = \]

c.

\[
g(x) = \]
3. Given a table of values for the exponential function \( f(x) \) and a description of the transformations for the function \( g(x) \), fill out the table of values based on the original points for \( g(x) \), the transformed function.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( -1 )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>( \frac{1}{2} )</td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>27</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( g(x) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. \( g(x) \) is Translated Down 4

<table>
<thead>
<tr>
<th>( x )</th>
<th>( -1 )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>( \frac{1}{2} )</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( g(x) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. \( g(x) \) is Translated Left 1 & Up 2

<table>
<thead>
<tr>
<th>( x )</th>
<th>( -1 )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>( \frac{1}{4} )</td>
<td>1</td>
<td>4</td>
<td>16</td>
<td>64</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( g(x) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c. \( g(x) \) is Reflect over \( x \)-axis

<table>
<thead>
<tr>
<th>( x )</th>
<th>( -1 )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>( \frac{1}{2} )</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<th>( x )</th>
<th>( -1 )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( g(x) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

d. \( g(x) \) is Vertical Stretch of Factor 3

<table>
<thead>
<tr>
<th>( x )</th>
<th>( -1 )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>( \frac{1}{2} )</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( x )</th>
<th>( -1 )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( g(x) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Given each of the graphs below are exponential functions of the form \( f(x) = a^x \), determine the parameter ‘\( a \)’ in each graph.

a. \( f(x) = \)

b. \( h(x) = \)
1. (Review) Solve the following linear equations.
   a. \(8d - 12 = 4(d + 2) - 2d + 10\)  
   b. \(2m - 2 + 3m + 1 = m + 2(2m - 3)\)

2. (Review) Solve the following quadratic equations.
   a. \(x^2 - 4x = 12\)  
   b. \(2b^2 - b = 10\)

3. Solve the following exponential equations.
   a. \(2^x = 128\)  
   b. \(3^t - 12 = 231\)
   c. \(4^{x-1} = 4096\)
   d. \(2 \cdot (3^t) - 120 = 366\)
   d. \(8^t = 4^{2+10}\)
4. (Review) Solve the following **linear** inequalities. Provide the answer as graph and in both set and interval notations.
   a. \(8a - 12 > 28\)
   b. \(3p + 14 + 2p + 1 \leq 2 + 8p\)

5. (Review) Solve the following **quadratic** inequalities. Provide the answer as graph and in both set and interval notations.
   a. \(x^2 + 3x < 10\)
   b. \(3x^2 + 2x - 8 \geq 0\)

6. Solve the following **exponential** inequalities. Provide the answer as graph and in both set and interval notations.
   a. \(3^x \geq 81\)
   b. \(5^{x-3} + 6 \geq 131\)
7. (BONUS) Solve the following exponential equations
   a. \( 4^x = -4 \)  
   b. \( 9^t = 3^t + 72 \)

8. Solve the following exponential equations using the graph.
   a. \( 2^{x+1} - 3 = 5 \)
   b. \( 2^{x+2} - 3 = -2 \)
   c. \( 2^{x+1} - 3 = 9 \)
   d. \( 2^{x+1} - 3 = x + 10 \)

9. Solve the following exponential equations using the graph and intersection features on your graphing calculator. (round to the nearest hundredths if necessary)
   a. \( 5x - 2^x = -x + 10 \)  
   b. \( x + 3^x - 2^x = -x^2 + 5 \)
(REVIEW) Arithmetic Sequences

1) \( 2, \ 8, \ 14, \ 20, \ \ldots \) \( \ldots \) \( \ldots \) 
   Find \( a_{29} = \) __________

2) \( 22, \ 19, \ 16, \ \ldots \) \( \ldots \) \( \ldots \) 
   Find \( a_{18} = \) __________

3) \( 3, \ 5.5, \ 8, \ 10.5, \ \ldots \) \( \ldots \) \( \ldots \) 
   Find \( a_{31} = \) __________

4) Karen is playing with triangular tiles to create a design. With each step she continues to add tiles. How many tiles will be required by the 16\(^{th}\) step?

\[ \triangle, \ \bigtriangleup, \ \bigtriangleup, \ \bigtriangleup, \ \bigtriangleup, \ \ldots \]
Geometric Sequences

5) 2, 6, 18, 54, 162, _____, _____, _____ ....... Find \(a_{16} = \) ________________

6) 384, 192, 96, 48, _____, _____, _____ ....... Find \(a_{13} = \) ____________

7) Vicky is playing with triangular tiles to create a design. With each step she continues to add tiles. How many tiles will be required by the 9th step?

\[
\begin{array}{cccc}
\text{step \#1} & \text{step \#2} & \text{step \#3} & \text{step \#4} \\
\end{array}
\]
7) 7, 13, 19, 25, ______, ______, ______ ………
Find \( a_{43} = \) ______

8) 4, 20, 100, 500, ______, ______, ______ ………
Find \( a_{12} = \) ______

9) 384, 192, 96, 48, ______, ______, ______ ………
Find \( a_{13} = \) ______

Functions can be used as explicit definitions for a sequence:
Consider the sequence: 3, 6, 12, 24, 48, 96, 192, …
The function \( h(x) = 3 \cdot 2^{x-1} \) could be used define the sequence
where \( x = \) the term number. The domain would be \{1, 2, 3, 4, ……\} and the range would be \{3, 6, 12, 24, ……\}

10) Create a sequence based on the function:
\[ f(x) = 6x - 2 \]

11) Create a sequence based on the function:
\[ f(x) = 4 \cdot 3^{x-1} \]

12) Describe the **domain & range** of a function that might describe the sequence of \{4, 7, 10, 13, ……\}

13) Describe the **domain & range** of a function that might describe the sequence of \{6, 12, 24, 48, ……\}

14) Determine the **common difference** of the sequence and write a function that could be used to describe the arithmetic sequence: \{26, 22, 18, 14, ……\}

15) Determine the **common ratio** of the sequence and write a function that could be used to describe the geometric sequence: \{4, 12, 36, 108, ……\}

16) Write a **recurrence relation** and an **explicit definition** for the following table:

<table>
<thead>
<tr>
<th>( n )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>……</th>
</tr>
</thead>
<tbody>
<tr>
<td>( a_n )</td>
<td>3</td>
<td>12</td>
<td>48</td>
<td>192</td>
<td>768</td>
<td>……</td>
</tr>
</tbody>
</table>

**RECURSIVE RELATION:**

**EXPLICIT DEFINITION:**
17) Write a recurrence relation and an explicit definition for the following graph:

**RECURSION RELATION:**

**EXPLICIT DEFINITION:**

18) Write a recurrence relation and an explicit definition for the following graph:

**RECURSION RELATION:**

**EXPLICIT DEFINITION:**

**SEQUENCES**

15) Given that a sequence is arithmetic, \(a_1 = 5\), and the common difference is 4, find \(a_{37}\).

16) Given that a sequence is arithmetic, \(a_{52} = 161\), and the common difference is 3, find \(a_1\).

17) Given that a sequence is geometric, the first term is 1536, and the common ratio is \(\frac{1}{2}\), find the 7th term in the sequence.

18) Given that a sequence is geometric, \(a_{10} = 98415\), and the common ratio is 3, find \(a_1\).
   A. Consider the following function.
   B. Consider the following function.

   ![Graph of y = 2^x - 4]

   i) Describe the **Domain**: ________________
   ii) Describe the **Range**: ________________
   iii) Describe **Intervals of Increase**: ________________
   iv) Describe **Intervals of Decrease**: ________________
   v) As \( x \to \infty \), determine \( f(x) \to \) ________________
   vi) As \( x \to -\infty \), determine \( f(x) \to \) ________________
   vii) Determine the **x-intercept**: ________________
   viii) Determine the **y-intercept**: ________________
   ix) **Horizontal Asymptote**: ________________

   ![Graph of y = (\frac{1}{3})^x - 3]

   i) Describe the **Domain**: ________________
   ii) Describe the **Range**: ________________
   iii) Describe **Intervals of Increase**: ________________
   iv) Describe **Intervals of Decrease**: ________________
   v) As \( x \to \infty \), determine \( f(x) \to \) ________________
   vi) As \( x \to -\infty \), determine \( f(x) \to \) ________________
   vii) Determine the **x-intercept**: ________________
   viii) Determine the **y-intercept**: ________________
   ix) **Horizontal Asymptote**: ________________

   C. Consider the following function.

   ![Graph of y = -2^x + 2]

   i) Describe the **Domain**: ________________
   ii) Describe the **Range**: ________________
   iii) Describe **Intervals where the graph is Positive**: ________________
   iv) Describe **Intervals where the graph is Negative**: ________________
   v) As \( x \to \infty \), determine \( f(x) \to \) ________________
   vi) As \( x \to -\infty \), determine \( f(x) \to \) ________________
   vii) Determine the **x-intercept**: ________________
   viii) Determine the **y-intercept**: ________________
   ix) **Horizontal Asymptote**: ________________
   A. Consider the following function.
   B. Consider the following function.

   i) Describe the **Domain**:__________________________

   ii) Describe the **Range**:__________________________

   iii) Describe **Intervals of Increase**:______________

   iv) Describe **Intervals of Decrease**:______________

   v) As \(x \to \infty\), determine \(f(x) \to \) ______________

   vi) As \(x \to -\infty\), determine \(f(x) \to \) ______________

   vii) Determine the \(x\)-intercepts:____________________

   viii) Determine the \(y\)-intercept:____________________

   ix) **Interval where graph is Negative**:___________

   i) Describe the **Domain**:__________________________

   ii) Describe the **Range**:__________________________

   iii) Describe **Intervals of Increase**:______________

   iv) Describe **Intervals of Decrease**:______________

   v) As \(x \to \infty\), determine \(f(x) \to \) ______________

   vi) As \(x \to -\infty\), determine \(f(x) \to \) ______________

   vii) Determine the \(x\)-intercepts:____________________

   viii) Determine the \(y\)-intercept:____________________

   ix) **Interval where graph is Negative**:___________

3. Create 3 different exponential functions of the form \(f(x) = a^x + b\) that have a range of \(y > 2\).

4. Find the average rate of change of the function \(f(x) = 3^x - 2\) from \(x = 1\) to \(x = 2\).

5. Find the average rate of change of the function \(f(x) = \left(\frac{1}{2}\right)^x + \frac{1}{2}\) from \(x = 0\) to \(x = 1\).
6. Consider the function \( f(x) = 3^x \) and \( g(x) = 2^x \)

a. Find a range of x-values for which the average rate of change of \( f(x) = 3^x \) is greater than the average rate of change of \( g(x) = 2^x \)

b. Find a range of x-values for which the average rate of change of \( f(x) = 3^x \) is less than the average rate of change of \( g(x) = 2^x \)
1. Consider folding a regular piece of paper in half and cutting a section out of the fold. Then, open the paper and count the number of holes created. Again, start with a new piece of paper. Fold the new paper in half twice and cut a hole from the fold. Open the paper and count the number of holes.

Try folding a paper in half 3 times and again cut a hole from the folded side and determine the number of holes created in the original paper. Continuing this sequence determine the number of holes after increasing the number of folds. Fill out the table below.

<table>
<thead>
<tr>
<th>Number of Folds</th>
<th>Number of Holes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Create a graph of the data.

a. Create an equation that describes the relationship between the number of folds and the number of holes created.

b. How many holes would be created if a cut could be made after 9 folds?

c. Should the graph be continuous or discrete? Explain.

d. What would be an appropriate Domain and Range?
2. Consider starting with 2 pennies. Flip them both and for each one that lands heads up, add a penny to the pile. So, the pile should increase in size. Again, flip the new pile of pennies which could be a size of 2, 3, or 4. For every penny that lands heads up add another penny to the pile. Repeat this process several times and record how the penny pile grows after each flip. Your values may differ on Flips 3 and 4.

<table>
<thead>
<tr>
<th>Number of Flips</th>
<th>Number of Pennies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Create a graph of the data.

a. Create an equation that describes the relationship between the number of flips and the number of pennies in the pile.

b. Approximately how many pennies would there be on the 9th flip?

c. Should the graph be continuous or discrete? Explain.

d. What is an appropriate Domain and Range for the situation?
3. Jason invested $3000 in a mutual fund that has shown a steady growth of 11% each year. Jason assumes the increase of 11% will be consistent over the next 20 years. The growth factor is 1.11. Determine the value of the account if left untouched over the next couple of years. Fill out the table and create a graph showing the value of the account over those years.

<table>
<thead>
<tr>
<th>Years Invested</th>
<th>Account Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$3000</td>
</tr>
<tr>
<td>1</td>
<td>$3330</td>
</tr>
<tr>
<td>2</td>
<td>$3696.30</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

a. Determine an equation that represents the value of the account \( t \) years after the initial investment.

b. Approximately, how many years will it take until the account reaches more than $10,000?

c. In your opinion, should the graph be continuous or discrete? Explain.

d. What is an appropriate Domain and Range for the situation?

4. Determine the Growth Factor, the percentage of increase or decrease, and the initial value of each of the following investment functions.

a. \( f(x) = 2200 \cdot (1.34)^x \)

b. \( p(x) = 3580 \cdot (0.86)^x \)

c. \( g(x) = 16 \cdot (2.4)^x \)

d. \( h(t) = 18200 \cdot (0.7)^t \)
4. Determine a function to describe each situation.

a. Lisa purchases a house for $120,000 in a good area. The value of houses in the area where the house was purchased is averaging an increase of 6% per year. Determine the growth factor and write a function that describes the value of the house \( t \) years after it was purchased.

How much will the house be worth in 12 years?

b. Jeff purchases a house for $150,000 in an area that is declining. The value of houses in the area where the house was purchased is averaging a decrease of 3% per year. Determine the decay factor and write a function that describes the value of the house \( t \) years after it was purchased.

How much will the house be worth in 12 years?

c. Freddie purchased a pair of never worn Vintage 1997 Nike Air Jordan XII Playoff Black Varsity Red White Shoes Size 12 for $380. The shoes have shown an average growth rate of 14% per year. Determine the growth factor and write a function that describes the value of the shoes \( x \) years after it was purchased.

d. Esther purchased a used car, a Ford Focus, for $8400. The car is expected to decrease in value by 20% per year over the next couple of years. Determine the decay factor and write a function that describes the value of the car \( x \) years after it was purchased and determine how much the car would be worth after 6 years.

e. The Earth's population as of 2016 is about 7.3 Billion. On average, the population increased by 1.13% each year. Determine the growth factor and write a function that describes the population of the earth \( x \) years after 2016.

(The estimate of the maximum sustainable population of earth is 10 Billion people. If the rate of growth remains consistent, in about what year do you think the earth will be at capacity?)