Using function notation.

Given \( f(x) = -2x + 3 \) and \( g(x) = 8x - 7 \), evaluate the following functions.

1. \( f(-5) = \)
   \[
   f(-5) = -2(-5) + 3 = 13
   \]

2. \( g(-5) = \)
   \[
   g(-5) = 8(-5) - 7 = -47
   \]

3. \( f(6) = \)
   \[
   f(6) = -2(6) + 3 = -9
   \]

4. \( g(6) = \)
   \[
   g(6) = 8(6) - 7 = 41
   \]

Using \( f(x) \) and \( g(x) \) above, solve for \( x \) given the following output values.

5. \( f(x) = 11 \)
   \[
   -2x + 3 = 11
   x = 4
   f(-4) = 11
   \]

6. \( g(x) = 25 \)
   \[
   8x - 7 = 25
   x = 4
   f(4) = 25
   \]

7. \( f(x) = 7 \)
   \[
   -2x + 3 = 7
   x = -2
   f(-2) = 7
   \]

8. \( g(x) = -31 \)
   \[
   8x - 7 = -31
   x = -3
   g(-3) = -31
   \]

Determine whether the given information represents an arithmetic or geometric sequence. Then write the recursive and the explicit formula for each.

9. \( 11, 17, 23, 29, ... \)
   \[
   a_0 = 5
   a_n = a_{n-1} + 6
   f(x) = 6x + 5
   \]

   Arithmetic or Geometric?

10. \( 4, 12, 36, 108, ... \)
   \[
   a_0 = 4\frac{2}{3}
   a_n = 3 \cdot a_{n-1}
   f(x) = 4 \left(3^x\right)
   \]

   Arithmetic or Geometric?

11. Write the first five terms in the sequence given the following recursive formula:

   \[
   a_0 = 22
   a_n = a_{n-1} - 8
   \]

   \[
   a_1 = 14 \quad a_2 = 6 \quad a_3 = -2 \quad a_4 = -10 \quad a_5 = -18
   \]

12. What are the first five terms in the sequence given the explicit formula:

   \[
   f(x) = 5(3)^x
   \]

   \[
   f(1) = 15 \quad f(2) = 45 \quad f(3) = 135 \quad f(4) = 405 \quad f(5) = 1215
   \]
13. Given the recursive formula, write the explicit formula.

\[ a_0 = 22 \]
\[ a_n = a_{n-1} \times 6 \]
\[ f(x) = 22 \cdot 6^x \]

(Geometric)

14. Given the explicit formula, write the recursive formula.

\[ f(x) = 12x + 13 \]
\[ a_0 = 13 \]
\[ a_n = a_{n-1} + 12 \]

(Arithmetic)

Below you are given various pieces of information. Graph each function and write the recursive and explicit functions for each sequence.

15. 16, 8, 4, 2, 1...

Recursive: \[ a_0 = 32 \]
\[ a_n = a_{n-1} \cdot \frac{1}{2} \]

Explicit: \[ f(x) = 32 \cdot \left(\frac{1}{2}\right)^x \]

16.

<table>
<thead>
<tr>
<th>Time (days)</th>
<th>Number of Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
</tr>
</tbody>
</table>

Recursive: \[ a_0 = 1 \]
\[ a_n = a_{n-1} + 4 \]

Explicit: \[ f(x) = 4x + 1 \]
17. Mr. Honell has decided to put money into a savings account that earns 4% interest each year. Mr. Honell starts by initially putting $2000 into his account.

a) Complete the table for the given scenario.

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount in savings account</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2000</td>
</tr>
<tr>
<td>1</td>
<td>2080</td>
</tr>
<tr>
<td>2</td>
<td>2163.20</td>
</tr>
<tr>
<td>3</td>
<td>2249.73</td>
</tr>
<tr>
<td>4</td>
<td>2339.72</td>
</tr>
</tbody>
</table>

b) Recursive Formula:  
\[ a_0 = 2000 \]
\[ a_n = a_{n-1} \cdot 1.04 \]

c) Explicit Formula:  
\[ f(x) = 2000 \cdot 1.04^x \]

How much money will Mr. Honell have in his account after 25 years (granted he is able to keep his grubby little hands off the money prior to that)? Which of the above formulas did you use to calculate this value?

\[ f(25) = 2000 \cdot 1.04^{25} = 5331.67 \]

Explicit blc I didn't know the 24th term (\(a_{24}\))

18. Molly has a $25 iTunes gift card. Each time she downloads a song it costs her $2.

**Arithmetic or Geometric?**

Recursive:  
\[ a_0 = 25 \]
\[ a_n = a_{n-1} - 2 \]

Explicit:  
\[ f(x) = -2x + 25 \]

How many songs can Molly download? Set up an equation and solve it to explain.

\[ 0 = -2x + 25 \]
\[ -25 = -2x \]
\[ x = 12.5 \]

She can download 12 songs. If she downloads 13 songs, she has -$1.00 on her card.

**Use the given table to answer the following questions.**

<table>
<thead>
<tr>
<th>(n)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f(n))</td>
<td>12</td>
<td>21</td>
<td>30</td>
<td>39</td>
<td>48</td>
<td>57</td>
</tr>
<tr>
<td>(+q)</td>
<td>(+q)</td>
<td>(+q)</td>
<td>(+q)</td>
<td>(+q)</td>
<td>(+q)</td>
<td>(+q)</td>
</tr>
</tbody>
</table>

19. a) When \(f(n) = 39\), what is the value of \(n\)? \(4\)

b) What is the value of \(f(n - 3)\)? \(12\)

\[ f(4-3) = f(1) = 3 \]

20. a) When \(f(n) = 30\), what is the value of \(n\)? \(3\)

b) What is the value of \(f(n + 1)\)? \(39\)

\[ f(3+1) = f(4) \]
Find the ARITHMETIC means of the following sequences and identify the constant difference.

21.  
\[
\begin{array}{c|ccccc}
  x & 1 & 2 & 3 & 4 & 5 \\
  y & 7 & 16 & 25 & 34 & 43 \\
\end{array}
\]
\[d = \frac{36}{4} = 9\]

22.  
\[
\begin{array}{c|cccccc}
  x & 1 & 2 & 3 & 4 & 5 & 6 \\
  y & 2 & -17 & -36 & -55 & -74 & -93 \\
\end{array}
\]
\[d = \frac{-95}{5} = -19\]

23.  
\[
\begin{array}{c|cccccc}
  x & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\
  y & 14 & 11.5 & 21 & 24.5 & 28 & 31.5 & 35 \\
\end{array}
\]
\[d = \frac{21}{6} = 3.5\]

24. Find the 4 arithmetic means between 16 and 101.

\[
\begin{array}{c|ccccc}
  & 16 & 101 & d = \frac{85}{5} = 17 \\
\end{array}
\]
\[33, 50, 67, 84\]

Find the GEOMETRIC means of the following sequences and identify the constant ratio.

25.  
\[
\begin{array}{c|ccccc}
  x & 1 & 2 & 3 & 4 & 5 \\
  y & 3 & 12 & 48 & 192 & 768 \\
\end{array}
\]
\[r = \sqrt[4]{256} = 4 \text{ or } -4\]

26.  
\[
\begin{array}{c|cccccc}
  x & 1 & 2 & 3 & 4 & 5 & 6 \\
  y & -7 & 21 & -63 & 189 & -567 & 1701 \\
\end{array}
\]
\[r = \sqrt[5]{-243} = -3\]

27.  
\[
\begin{array}{c|cccccc}
  x & 1 & 2 & 3 & 4 & 5 & 6 \\
  y & 1824 & 912 & 456 & 228 & 114 & 57 \\
\end{array}
\]
\[r = \frac{1}{\sqrt[5]{32}} = \frac{1}{2}\]

28. Find the 3 geometric means between 4 and 5184.

\[r = \sqrt[4]{1296} = 6 \text{ or } -6\]
\[24, 144, 864 \text{ or } -24, 144, -864\]