Module 2 Test Review

Determine whether the following situations are Linear (L), Exponential (E), or Neither (N).

1. \( f(x) = a(b)^x \)
2. \( f(x) = m(x - x_1) + y_1 \)
3. \( a_0 = y - \text{intercept}; a_n = a_{n-1} + d \)
4. \( a_0 = y - \text{intercept}; a_n = a_{n-1} \cdot r \)
5. \( f(x) = mx + b \)
6. \( f(x) = ax^2 + bx \)

7.

8. | \( x \) | \( f(x) \) |
---|---|---|
2 | -9 |
3 | 3 |
4 | 15 |
5 | 27 |

9. Mark has one penny in his piggy bank. Each day he wants to double the amount of money in his piggy bank so he can save up to buy a new video game.

10.

11. | \( x \) | \( f(x) \) |
---|---|---|
0 | -22 |
2 | -4 |
3 | 5 |
5 | 23 |

12.

13. | \( x \) | \( f(x) \) |
---|---|---|
1 | 10 |
2 | 20 |
3 | 40 |
5 | 160 |

14. Alice bakes brownies for all her friends. She makes a baker’s dozen every day to make sure she has enough for each friend to have one.
Use the graph of the function to the right for questions 15-17.

15. Is the function linear or exponential? Why?

16. What is the domain of this function?
   - A. Natural numbers (\(\mathbb{N}\))
   - B. Whole numbers (\(\mathbb{W}\))
   - C. All Real numbers (\(\mathbb{R}\))
   - D. Integers (\(\mathbb{Z}\))

17. Is the function discrete or continuous? Why?

18. Water flows over Shoshone Falls at a rate of 300 ft³ per second. Is the relationship between seconds and cubic feet of water flowing over the waterfall continuous or discrete? Why?

19. Write the equation of each of the following using the form indicated.

   a. Point-Slope Form
   b. Slope-Intercept Form
   c. Point-Slope Form

   **Graph:**

   ![Graph](image)

   **Info:** 
   - Point-Slope Form: \(m = \frac{2}{3}, y - \text{int: (0, -3)}\)
   - Slope-Intercept Form: \(y = -5x + 7\)
   - Point-Slope Form: \(\text{point: (-3, -2)}, m = 6\)

20. Verify that the following equations are equal: \(y = -5x + 7\) and \(y + 3 = -5(x - 2)\)
The small town of Jesperville has seen a sudden increase in rat population, so they have proposed a new extermination plan to deal with the vermin. The plan is expected to eliminate 10% of the rats in Jesperville throughout each month. The starting population of rats is 19,500.

21. Fill in the table and graph to describe the relationship. Label the graph with the correct scale and label the axes.

<table>
<thead>
<tr>
<th>Months</th>
<th>Rat Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22. Is the relationship **Linear** or **Exponential**? Why?

23. Is the relationship **Discrete** or **Continuous**? Why?

24. Write an explicit function that shows how many rats remain in the town after \( x \) months.

25. Using the explicit equation from problem 24, explain what each number of the function represents.

There is a very kind man who enjoys giving monetary donations to his favorite charity. He’s made a personal goal of giving an average of 3 dollars per day.

26. Fill in the table and graph to describe the relationship. Label the graph with the correct scale and label the axes.

<table>
<thead>
<tr>
<th>Days</th>
<th>Money Given</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

27. Is the relationship **Linear** or **Exponential**? Why?

28. Is the relationship **Discrete** or **Continuous**? Why?

29. Write an explicit function that shows how many dollars were given out.

30. Using the explicit equation from problem 29, explain what each number of the function represents.
31. Explain what makes a sequence discrete. Use an example to help in your explanation.

32. If a relationship is continuous it will never be a sequence. Use an example to help explain why.

Let \( f(x) = 3(x - 2) + 1 \) and \( g(x) = 5 \cdot 3^x \). Fill in the output values for each function in the tables below, then graph the function on the corresponding graph:

33. \[
\begin{array}{c|c}
  x & f(x) \\
  \hline
  & \\
  & \\
  & \\
  & \\
  & \\
\end{array}
\]

34. \[
\begin{array}{c|c}
  x & g(x) \\
  \hline
  & \\
  & \\
  & \\
  & \\
  & \\
\end{array}
\]

35. As the input \( x \) becomes larger and larger, which function (linear or exponential) produces a larger output? Why?

Verify the following equations are equal.

36. \( y = -3x + 4 \) and \( y - 13 = -3(x + 3) \)

37. \( y = 2x - 1 \) and \( y = 2(x - 1) + 1 \)

Classify each number into its number set.

38. \( -\frac{5}{2} \)  
39. 25  
40. \( \sqrt{5} \)  
41. 0