Chapter 2 Review

Graph the following functions.

1. \( f(x) = -\frac{2}{3}x + 1 \)

2. \( x - 2y = 6 \)
   \[ \begin{align*}
   x &= 6 \\
   y &= 3 \\
   (6, 3)
   \end{align*} \]

3. \( y = -2|x - 1| + 3 \)
   \( \text{Vertex: } (1, 3) \)
   \( a = -2 \)

4. \( y < -x - 3 \)

5. \( 3x - 2y < 12 \)
   \[ \begin{align*}
   x &= -3 \\
   y &= 3 \\
   (-3, 3)
   \end{align*} \]

6. \( y \geq -|x + 1| + 2 \)
   \( \text{Vertex: } (-1, 2) \)
   \( a = -1 \)
   \( x \geq -1 + 2 \)
   \( x \geq 1 \)

7. Describe what a function is: \textit{every input has exactly one output}

   How you can test if you have a function given a
   1) Graph: \textit{vertical line test}
   2) Table: \textit{wrapping diagram - arrows}
   3) Ordered Pair: \textit{not x-repeats}

8. Consider \( f(x) = 2x + 1 \).
   A) Find \( f(7) \)
   \[ f(7) = 2(7) + 1 = 15 \]
   B) Find \( f(x) = 7 \)
   \[ x = \frac{7 - 2x}{2} = 3 \]
   C) Explain the difference between A and B
   \( \text{plugging in } 7 \text{ for } x \text{ vs. setting } y = 7 \text{ and solving for } x \)

9. What is the domain and range of the function in the graph? Represent it as an inequality.
   \( D: -4 \leq x \leq -1 \)
   \( R: -2 \leq y \leq 2 \)

10. A) Tell whether the function is linear. B) Evaluate the function for \( f(-2) \)
    \[ f(x) = 3x + 4 \]
    \[ f(x) = 1 - x \]
    \[ f(x) = x^2 \]
    \[ f(x) = 2x \]
    \[ y = mx + b \]
    \[ y = m(x - b) \]
    \[ 3(-2) + y = 0 \]
    \[ y = -x + 1 \]
    \[ y = x^2 \]
    \[ f(-2) = 4 \]
    \[ f(-2) = 0 \]
    \[ f(-2) = 1 \]
    \[ f(-2) = -4 \]
1. Write an equation for the relation in each scenario in all three forms:

A) \[ m = -2 \]
\[ b = b \]
\[ (-1, 2) \]

Point-Slope Form: \( y - 2 = -2(x + 1) \)
Slope-Intercept: \( y = -2x + 0 \)
Standard Form: \( 2x + y = 0 \)

B) \[ m = 1 \]

(h,k) Form: \( y = -x - 3 \)
As a piecewise function:
\[ \begin{align*}
  &x - 3 & x < 3 \\
  &-x + 3 & x \geq 3 
\end{align*} \]

C) A line that passes through the points (2,3) and (-5, 4)
\[ \frac{y - 3}{-5 - 2} = \frac{1}{-7} \]
\[ 2y = 7x + b \]
\[ b = \frac{23}{7}(\frac{1}{7}x + \frac{3}{7}) \]

D) A line that has a slope of 2/3 and goes through the point (6, 1)
\[ y - 1 = \frac{2}{3}x - 4 \]
\[ y = \frac{2}{3}x - 3 \]
\[ (\frac{2}{3}x + y = -3) \]

E) A line that is parallel to the line \( y = 2x + 7 \) and goes through (-3, 4)
\[ y - 4 = 2x + 6 \]
\[ (-2x + y = 16) \]

F) A line that is perpendicular to the line \( y = 2x + 7 \) and goes through (-3, 4)
\[ y - 4 = -\frac{1}{2}x - \frac{1}{4} \]
\[ y = -\frac{1}{2}x + \frac{1}{4} \]
\[ \left( \frac{1}{2}x + y = \frac{5}{2} \right) \]

G) Write an inequality to model the total amount of money you need to go to the movies and buy an unknown amount of candy. The ticket costs $9.00 and it is $2.00 per box of candy.
\[ y \geq 2x + 9 \]

H) The variables \( x \) and \( y \) vary directly and \( y = 3 \) when \( x = \frac{1}{2} \)

Point-Slope Form:
Slope-Intercept:
Standard Form:

Point-Slope Form:
Slope-Intercept:
Standard Form:
12. Write an equation for the absolute value equation that is reflected over the x-axis and shifted 2 to the left and up seven.

\[ y = -|x + 2| + 7 \]

13. Consider \( g(x) = 2x + 1 \)

Graph A) \( y = g(x) + 1 \)

\[ y = 2x + 2 \]

Graph B) \( y = g(x - 2) \)

\[ y = 2(x - 3) \]

Graph C) \( y = -3g(x) \)

\[ y = -6x + 3 \]

14. Describe if the line passing through the points below is a.) Rising or falling or horizontal or vertical b.) Steeper or flatter than the graph of \( y = x \)

a) \( \frac{2 + 1}{5 - 4} = \frac{3}{1} = 3 \)
   a) Rising, Steeper

b) \( \frac{10 - 0}{3 - 1} = \frac{10}{2} = 5 \)
   a) Rising, Steeper

(1, 0) and (3, 10)

(4, -1) and (5, 2)

a) \( \frac{3 - 3}{4 - 2} = \frac{0}{2} = 0 \)
   a) Horizontal

b) Flatter

(2, 3) and (4, 3)

15. Line 1 contains (2, 11) and (0, 7).
   Line 2 contains (-8, 5) and (-2, 2).
   Are the lines parallel, perpendicular, or neither?

   Line 1:
   \[ \frac{7 - 11}{0 - 2} = \frac{-4}{-2} = 2 \]
   \[ \frac{7 - 11}{0 - 2} = \frac{2}{1} = 2 \]

   Line 2:
   \[ \frac{-8 - 5}{2 + 8} = \frac{-3}{10} \]

   Perpendicular

16. Explain what the correlation coefficient shown means then DRAW a scatterplot that would have the following correlation coefficient:

\( r = 0.5 \) weak positive correlation

\( r = -1 \) perfect negative correlation

\( r = 0.7 \) strong positive correlation

\( r = 0.1 \) weak positive correlation

\( r = 0.0 \) no correlation
17. For the data given, approximate the equation of the best-fitting line. SHOW ALL WORK FOR FULL CREDIT.

<table>
<thead>
<tr>
<th>x</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>-1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

BY HAND: 

\[
\frac{2+1}{5-4} = \frac{3}{1} \quad 2 = 3(5) + b \\
2 = 15 + b \\
b = -13
\]

Equation: \( y = 3x - 13 \) 

*One possible solution*

WITH CALCULATOR:

Equation: \( y = x - 3.4 \) 

Correlation Coefficient: \( r = 0.9 \)

Explain what this correlation coefficient means about your data: **Strong positive correlation**

18. Explain:

How do you GRAPH a line that has an equation of the form \( Ax + By = C \)?

**Using x-int and y-int**

Tell me everything you know about slope / rate of change?

<table>
<thead>
<tr>
<th>pos</th>
<th>reg</th>
<th>horizontal-0</th>
<th>vertical/ ( \frac{rise}{run} )</th>
<th>constant ( \frac{y_2-y_1}{x_2-x_1} )</th>
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What is a piecewise function? How do you evaluate a piecewise function?

**Discrete function**

What is a “step function”?

**Piecewise function** that represents steps - all horizontal

- (5)

- (5)