Section 2 – Cumulative Take Home Assignments

1. Determine the Domain and Range of the relations below.
   a) \((-1, 4), (-2, 4), (-3, 4)\)
   
   Domain: \([-1, -2, -3]\)
   Range: \([4]\)

   b) \((4, -1), (4, -2), (4, -3)\)
   
   Domain: \([4]\)
   Range: \([-1, -2, -3]\)

2. Write the mapping diagram in ordered pair notation
   a) \(\begin{array}{ccc}
   1 & \rightarrow & -2 \\
   2 & \rightarrow & 0 \\
   3 & \rightarrow & 1 \\
   \end{array}\)

   b) \(\begin{array}{ccc}
   1 & \rightarrow & 0 \\
   2 & \rightarrow & -2 \\
   3 & \rightarrow & 0 \\
   \end{array}\)

3. Draw mapping notation from the ordered pairs provided.
   a) \((1, 2), (1, -2), (1, 0)\)

   b) \((2, 1), (-2, 1), (0, 1)\)

4. What is the Domain and Range of the graphs below?
   a) \(\begin{array}{cc}
   \text{Domain} & \text{Range} \\
   -3 \leq x \leq 3 & -3 \leq y \leq 3 \\
   \end{array}\)

   b) \(\begin{array}{cc}
   \text{Domain} & \text{Range} \\
   x \neq 0 & y \leq 0 \\
   \end{array}\)
5. Are the following graphs functions, 1-1 functions, or neither. What tests did you employ to find out?
   a) Answer: No
   b) Answer: Yes 1-1

   Used Vertical Line Test

6. The table of ordered pairs below defines a function.

<table>
<thead>
<tr>
<th>x</th>
<th>4</th>
<th>2</th>
<th>0</th>
<th>-2</th>
<th>-4</th>
<th>-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>-6</td>
<td>-4</td>
<td>-2</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

   a. Express this function using mapping notation

   b. Express this function using ordered pair notation

   \((4, -6) \quad (2, -4) \quad (0, -2) \quad (-2, 0) \quad (-4, 2) \quad (-6, 4)\)

   c. Graph the function
7. Graph the linear equations, are they functions and how do you know?
   a) \( 3x + \frac{1}{2}y = 3 \)
   \[
   \begin{array}{c|c|c}
   x & y \\
   \hline
   0 & 6 \\
   1 & 0 \\
   -1 & 12 \\
   \end{array}
   \]
   \[3x + \frac{1}{2}y = 3 \quad \Rightarrow \quad \frac{1}{2}y = -3x + 3 \]
   \[y = -6x + 6 \]

   b) \( 2x - 4y = -8 \)
   \[
   \begin{array}{c|c|c}
   x & y \\
   \hline
   0 & 2 \\
   -4 & 0 \\
   4 & 4 \\
   \end{array}
   \]

8. Graph the non-linear equations, and determine if the relation is also a function
   a) \( x = y^2 \)
   \[
   \begin{array}{c|c|c|c|c|c|c|c}
   x & 0 & 1 & 1 & 4 & 4 & 9 & 9 \\
   y & 0 & 1 & -1 & 2 & -2 & 3 & -3 \\
   \end{array}
   \]
9. Find the slope of the line that goes through the following pairs of points
   a) \((-2, 5)\) and \((4, -3)\)

   \[
   \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 5}{4 - (-2)} = \frac{-8}{6} = \frac{-4}{3}
   \]

   b) \((6, -2)\) and \((-4, -3)\)

   \[
   \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - (-2)}{-4 - 6} = \frac{-1}{-10} = \frac{1}{10}
   \]

   c) \((3, 1)\) and \((-4, 6)\)

   \[
   \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 1}{-4 - 3} = \frac{5}{-7} = -\frac{5}{7}
   \]

   d) \((a, -b)\) and \((-b, a)\)

   \[
   \frac{y_2 - y_1}{x_2 - x_1} = \frac{a - (-b)}{-b - a} = \frac{a + b}{-b - a}
   \]

   e) \((-3, 0)\) and \((-3, 4)\)

   \[
   \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 0}{-3 - (-3)} = \frac{4}{0} \text{ undefined}
   \]

   f) \((4, -1)\) and \((-2, -1)\)

   \[
   \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - (-1)}{-2 - 4} = \frac{0}{-6} = 0
   \]
10. What is the slope of the graphs below

a) Slope: \(\frac{7}{6}\)

b) Slope: \(-1\)

11. George rents a motor scooter for three hours to travel around Crescent Beach. It costs him $36.00 for travelling 42 km.

a. Determine the average speed in km/h

\[
\text{Average speed} = \frac{\text{total distance}}{\text{total time}} = \frac{42 - 0}{3 - 0} = \frac{42}{3} = 14 \text{ km/h}
\]

b. Determine the rental rate in dollars per hour

\[
\text{Rental rate} = \frac{\text{total cost}}{\text{total time}} = \frac{36 - 0}{3 - 0} = \frac{36}{3} = 12 \text{ /hr}
\]

c. Determine the rental rate in cents per km

\[
\text{Rental rate} = \frac{\text{total cost}}{\text{total distance}} = \frac{36}{42} = \frac{6}{7} = 0.86 \text{ /km}
\]

12. Find the number \(n\), so that the line passing through the point \((-3, 5)\) and \((4, n)\) has slope of 3.

\[
\frac{n-5}{4-(-3)} = \frac{3}{1} \quad \text{and} \quad \frac{n-5}{7} = 3
\]

\[
21 = n - 5 \quad \Rightarrow \quad n = 26
\]
13. Find the value of $c$ so that the line passing through the points $(-2, -4)$ and $(-1, -1)$ is:
   a. Parallel to the line through $(6, -2)$ and $(3, c)$
      \[
      \frac{-1 - (-4)}{-1 - (-2)} = \frac{3}{1}, \quad \frac{c - (-2)}{3 - 6} = \frac{3}{1}, \quad \frac{c + 2}{3} = 3, \quad c + 2 = 9, \quad c = -11
      \]
   b. Perpendicular to the line through $(6, -2)$ and $(3, c)$
      \[
      \frac{c - (-2)}{3 - 6} = \frac{-1}{3}, \quad \frac{c + 2}{-3} = \frac{-1}{3}, \quad c + 2 = 1, \quad c = -1
      \]

14. Each semester at college, a student must pay tuition costs plus a student service fee. To take five courses costs $3270, and to take four courses costs $2640.
   a. Find the cost per course
      \[
      \frac{2640 - 3270}{4 - 5} = \frac{-630}{-1} = 630 \text{ per course}
      \]
   b. Find the student service fee
      \[
      \begin{align*}
      c &= 630x + \text{fee} \\
      3270 - 3150 &= \text{fee} \\
      120 &= \text{fee}
      \end{align*}
      \]
   c. Find the Domain and Range
      Domain: \{120, 750, 1380, 2010, 2640, 3270\}
      Range: \{0, 1, 2, 3, 4, 5\}

15. What is the slope and why of:
   a) A horizontal line: \( \text{0 no rise so} \frac{0}{\text{run}} \)
   b) A vertical line: \( \text{Undefined no run so} \frac{\text{rise}}{0} \)

For Herlaar:
\[
L - T: 2 - 1 \quad L - T: 2 - 2 \quad L - T: 2 - 4 \quad L - T: 2 - 5
\]