There are 11 problems on this exam. Carefully read and follow all directions. In order to receive credit show all necessary work. No credit will be given for an answer I cannot find or cannot read. All answers should be in simplest form.

1. Indicate where each of the following points is located—(A) in the first quadrant, (B) in the second quadrant, (C) in the third quadrant, (D) in the fourth quadrant, (E) on the x-axis, or (F) on the y-axis. (2 points each)

   - B (-3, 4)
   - A (2, 3)
   - E (-5, 0)
   - C (-3, -4)

In problems 2-3, plot enough points to accurately graph the given relation and determine its domain and range. (8 points each)

2. \((x - 2)^2 + (y + 3)^2 = 16\)

   Domain \([-2, 6]\)
   Range \([-7, 1]\)
3. \( y = x^2 - 4 \)

\[
\text{Domain } \left( -\infty, \infty \right)
\]

\[
\text{Range } \left[ -4, \infty \right)
\]

4. Determine the domain and range of each of the following functions. (2 points each)

(a) \( y = 2 - \sqrt{x} \)

\[
\text{Domain } \left[ 0, \infty \right)
\]

\[
\text{Range } \left( -\infty, 2 \right]
\]

(b) \( y = x^2 + 4x \)

\[
\text{Domain } \left( -\infty, \infty \right)
\]

\[
\text{Range } \left[ -4, \infty \right)
\]
5. Use the graph of \( y = F(x) \) shown below in standard window to determine the following. (3 points each)

(a) y-intercept

\( (0, -4) \)

(b) slope of this line

\( \frac{3}{2} \)

(c) The equation of this line

\[ y = \frac{3}{2} x - 4 \]

(d) x-intercept

\( \left( \frac{8}{3}, 0 \right) \)

6. Complete the following table of values for a linear function that has slope \( \frac{-3}{7} \) and whose graph contains the point \( (2, 4) \). (2 points each)

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>~5</td>
<td>7</td>
</tr>
<tr>
<td>-12</td>
<td>10</td>
</tr>
</tbody>
</table>
7. Use the graph of \( y = G(x) \) shown below to determine the following. (3 points each)

(a) Domain of \( G \) 
\([-4, 7]\)

(b) Range of \( G \) 
\([-5, 12]\)

(c) The interval(s) for \( x \) where \( G \) is increasing 
\((-1, 0)\)

(d) The interval(s) for \( x \) where \( G \) is decreasing 
\((-4, -1) \cup (0, 3)\)

(e) The interval(s) for \( x \) where \( G \) is constant 
\((3, 7)\)

(f) \( G(1) = 3 \)

(g) \( G(-2) = 6 \)

(h) y-intercept 
\((0, 4)\)

(i) x-intercept(s) 
\((2, 0)\)
8. Indicate the domain and range of the following linear functions. Also determine the x- and y-intercepts. (3 points each)

\[2x - 7y = 42\]

\[
\begin{align*}
\text{Domain} & \quad (-\infty, \infty) \\
\text{Range} & \quad (-\infty, \infty)
\end{align*}
\]

x-intercept \((21, 0)\) 

y-intercept \((0, -6)\)

9. Graph the line in problem 8.

10. In 1998 the cost of a microwave oven was $275. In 2008 it was $130. Assume the cost of a microwave can be modeled using a linear function.

(a) Over time is the cost of a microwave increasing, decreasing, or remaining constant? (2 points)

decreasing

(b) What was the average rate of change in the cost of a microwave from 1998 to 2008? (2 points)

\[
\frac{275 - 130}{1998 - 2008} = \frac{145}{-10} = -14.5
\]

$14.50 per year
11. (a) Calculate the distance between (1, –5) and (10, –2). (3 points)

\[
\sqrt{(10-1)^2 + (-2-(-5))^2} = \sqrt{81 + 9} = \sqrt{90} = 3\sqrt{10}
\]

(b) What is the midpoint of the segment whose endpoints are (1, –5) and (10, –2)? (3 points)

\[
\left(\frac{1+10}{2}, \frac{-5+(-2)}{2}\right) = \left(\frac{11}{2}, \frac{-7}{2}\right)
\]

(c) What should the number k be if (3, k), (1, –5) and (10, –2) are collinear? (4 pts)

(3, k) and (1, –5) lie on a line with

Slope \( \frac{k-(-5)}{3-1} = \frac{k+5}{2} \)

(1, –5) and (10, –2) lie on a line with

Slope \( \frac{-2-(-5)}{10-1} = \frac{3}{9} = \frac{1}{3} \)

Solve \( \frac{k+5}{2} = \frac{1}{3} \).

\[
3(k+5) = 2
\Rightarrow
3K + 15 = 2
\Rightarrow
3K = -13
K = -\frac{13}{3}
\]