Practice Test for chapter 1
Math 1

Show work where appropriate. Answers without adequate justification will not receive full credit.

1) Circle the letter for each of the following which represent a function.
   
   a) \[ \begin{array}{c|ccc} 
   x & 5 & 7 & 9 \\
   \hline 
   f(x) & -1 & 4 & 6 
   \end{array} \]
   
   b) \[ \begin{array}{c|ccc} 
   x & 5 & 7 & 7 \\
   \hline 
   g(x) & -1 & 4 & 6 
   \end{array} \]
   
   c) \[ \begin{array}{c|ccc} 
   x & 5 & 7 & 9 \\
   \hline 
   h(x) & -1 & 4 & 4 
   \end{array} \]
   
   d) \[ \text{Graph of a function with a non-linear shape} \]
   
   e) \[ \text{Graph of a function with a non-linear shape} \]
   
   f) \[ \text{Graph of a circle} \]
   
   g) If any of the functions you circled are also one-to-one write the letter(s) here ________

2) The function \( f(x) \) is represented by the table below

\[ \begin{array}{c|c|c|c|c|c|c} 
   x & -3 & -2 & -1 & 0 & 1 & 2 & 3 \\
   \hline 
   f(x) & 6 & 4 & 1 & -1 & 2 & 3 & 4 
   \end{array} \]

   a) Evaluate \( f(2) \) \[ \quad \]
   b) Solve \( f(x) = 4 \) \[ \quad \]
   c) Is \( f(x) \) one-to-one? \[ \quad \]
   d) Find the average rate of change of \( f(x) \) on \([0,2]\) \[ \quad \]

3) Given \( g(x) = 4x - x^2 \), evaluate & simplify
   a) \( g(-3) \) \[ \quad \]
   b) \( g(x+3) \) \[ \quad \]
4) A function $G = f(n)$ gives the number of tons of garbage, $G$, produced by $n$ households in a month. Explain the meaning of $f(4) = 8$ in words. (Answer in a complete sentence)

5) Find and simplify the average rate of change of $g(x) = x^2 - 4x$ on the interval $[a, 1]$

6) In part a, find the domain of $g(x)$. In part b, find the domain & range of $f(x)$. Write your answers in interval notation.
   
   a) $g(x) = \frac{\sqrt{x - 2}}{x - 5}$   
      Domain of $g(x)$____________________

   b)   
      Domain of $f(x)$____________________
      Range of $f(x)$____________________
      $f(x)$ is decreasing on: ________________
      $f(x)$ is concave up on: ________________

7) (10pts) Given the table below, evaluate the following:

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
<th>$g(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>

   a. $f(g(5)) = _______________________
   
   b. $g(f(2)) = _______________________
   
   c. $g(g(2)) = _______________________
   
   d. $g^{-1}(5) = _______________________
   
   e. $f^{-1}(5) = _______________________


8) (11pts) Given \( f(x) = 2\sqrt{x+3} \) and \( g(x) = 3x^2 - 3 \)

a) Evaluate \( g(f(1)) \)

b) Find & Simplify \( f(g(x)) \)

c) What is the domain of \( f(g(x)) \)

9) (4pts) Based on the graphs shown below

![Graph of f(x)](image1)

![Graph of g(x)](image2)

a. Evaluate \( f(g(2)) \)

b. Evaluate \( f^{-1}(2) \)

10) (5pts) Suppose the function \( P(t) \) gives the estimated population of a town \( t \) years after 2011. The function \( N(c) \) gives the size of population that \( c \) police officers can patrol. Interpret (explain in plain English) the meaning of the statement \( 200 = N^{-1}(P(5)) \)

11) (4pts) If \( f(x) = 300 + 15x \), find \( f^{-1}(30) \)
12) (5pts) Write an equation for a square root function that has been flipped over the \(y\)-axis, compressed horizontally by \(\frac{1}{2}\), and shifted up 2.

13) (10pts) Based on the graph of \(f(x)\) given here

Sketch a graph of \(g(x) = -2f(x - 1)\) and describe the transformation in words

14) (13pts) The following graph is made from pieces of three transformed toolkit functions. Write a piecewise defined function that describes the graph.

\[
\begin{cases} 
\text{__________________________} & \text{if } \text{__________________________} \\
\text{__________________________} & \text{if } \text{__________________________} \\
\text{__________________________} & \text{if } \text{__________________________}
\end{cases}
\]

\(f(x) = \)