Section 1.3 - 30, 54, 55, 57

30) First note that the domain of \( f + g \) is the intersection of the domains of \( f \) and \( g \); that is \( f + g \) is only defined where both \( f \) and \( g \) are defined. Taking the horizontal and vertical units of length to be the distance between successive vertical and horizontal gridlines, we can make a table of approximate values as follows:

<table>
<thead>
<tr>
<th>( x )</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>2.5</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>-1</td>
<td>2.2</td>
<td>2.0</td>
<td>2.4</td>
<td>2.7</td>
<td>2.7</td>
<td>2.3</td>
</tr>
<tr>
<td>( g(x) )</td>
<td>1</td>
<td>-1.3</td>
<td>-1.2</td>
<td>-0.6</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>( f(x) + g(x) )</td>
<td>0</td>
<td>0.9</td>
<td>0.8</td>
<td>1.8</td>
<td>3.0</td>
<td>3.2</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Extra values of \( x \) (like the value 2.5 in the table above) can be added as needed.

54) 
(a) \( f(g(1)) = f(6) = 5 \)
(b) \( g(f(1)) = g(3) = 2 \)
(c) \( f(f(1)) = f(3) = 4 \)
(d) \( g(g(1)) = g(6) = 3 \)
(e) \( (g \circ f)(3) = g(f(3)) = g(4) = 1 \)
(f) \( (f \circ g)(6) = f(g(6)) = f(3) = 4 \)

55) 
(a) \( g(2)=5 \) because the point (2,5) is on the graph of \( g \). Thus, \( f(g(2)) = f(5) = 4 \), because the point (5,4) is on the graph of \( f \).

(b) \( g(f(0)) = g(0) = 3 \)
(c) \( (f \circ g)(0) = f(g(0)) = f(3) = 0 \)
(d) \( (g \circ f)(6) = g(f(6)) = g(6) \).

This value is not defined because there is no point on the graph of \( g \) that has \( x \)-coordinate 6.

(e) \( (g \circ g)(-2) = g(g(-2)) = g(1) = 4 \)
(f) \( (f \circ f)(4) = f(f(4)) = f(2) = -2 \)

57) 
(a) Using the relationship distance = rate * time with the radius \( r \) as the distance, we have \( r(t) = 60t \).

(b) \( A = \pi r^2 \Rightarrow (A(t)) = \pi(60t)^2 = 3600\pi t^2 \). This formula gives us the extent of the rippled area (in cm²) at any time \( t \).