Section 1.3
NEW FUNCTIONS FROM OLD
September 7, 2012

1. Consider the function $g(x) = -(x + 10)^2 + 5$.

   (a) Identify a common function, $f(x)$, which can be transformed to get $g(x)$.

   (b) Describe, in complete sentences, what transformations are done to $f(x)$, found in part (a), to obtain $g(x)$.

   (c) Sketch the graphs of $f(x)$ and $g(x)$ on the same set of axes.
2. Determine whether the function \( f(x) = x^3 + x^2 + x \) is even, odd or neither. Explain your answer.

3. The cost of producing \( q \) items is given by the function

\[ C = f(q) = 100 + 2q. \]

(a) Find a formula for the inverse function.

(b) Explain in practical terms what the inverse function tells you.

4. Consider the function represented by the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>3</td>
<td>-7</td>
<td>19</td>
<td>4</td>
<td>178</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

(a) Write a table of values for \( f^{-1} \).

(b) State the domain of \( f^{-1} \).
5. Let $f(x) = \sqrt{x + 4}$ and $g(x) = x^2$. Find the following:

(a) $f(g(1))$

(b) $g(f(1))$

(c) $f(g(x))$

(d) $g(f(x))$

(e) $f(t)g(t)$