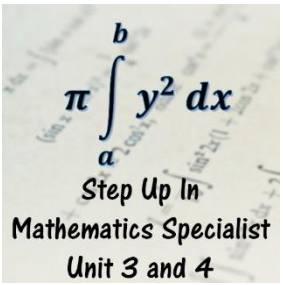
# 2.1 Composite Functions

*Problems Worksheet*




1. Let $f(x) = \frac{x}{3} - 1$, $g(x) = 5x + 4$ and $h(x) = \sqrt{x}$. Determine the following composite functions.

   a. $g \circ f(x)$

   b. $f \circ g(x)$

   c. $h \circ g(x)$

   d. $g \circ h(x)$

   e. $h \circ g \circ f(x)$

2. For each set of functions, state the domain and range of $f$ and $g$. Then determine $f \circ g(x)$ and $g \circ f(x)$ and state the domain and range of each of those functions.

   a. $f(x) = 2x + 1$ and $g(x) = \sqrt{x}$

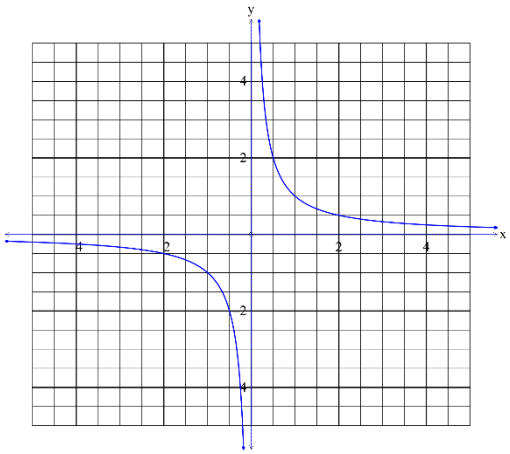
   b. $f(x) = \frac{1}{x}$ and $g(x) = 3x - 7$

   c. $f(x) = \frac{1}{x}$ and $g(x) = x^2 - 1$

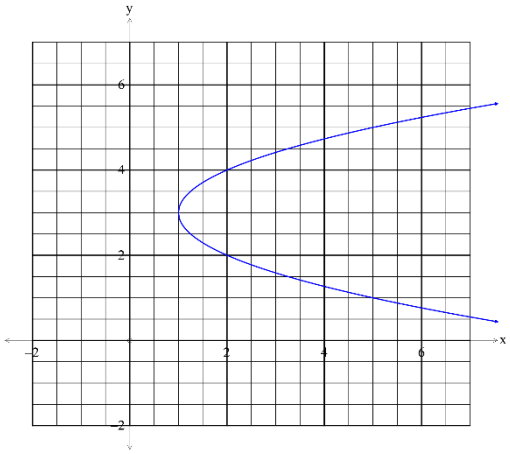
3. Let $f(x) = \sqrt{x}$ and $g(x) = 9 - x^2$. Determine the domain and range of $f \circ g(x)$.

4. Classify the following graphs as one-to-one, many-to-one, or one-to-many.

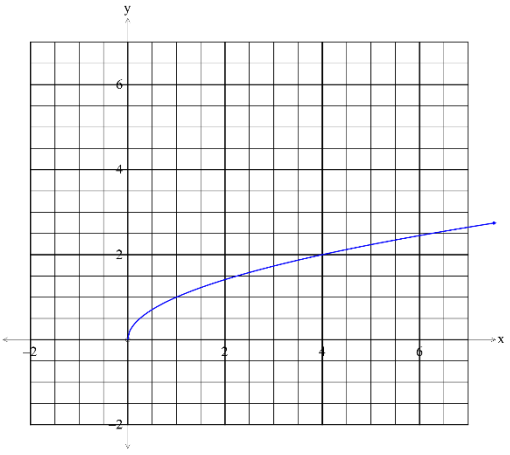
a.



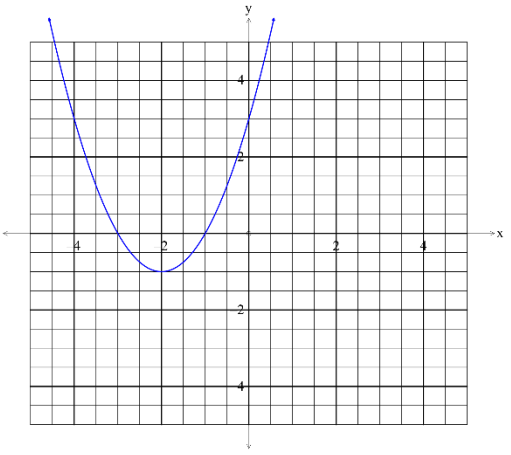

b.




c.




d.



5. For each of the following criteria, state a possible $g(x)$.

   a. $f(x) = 2x + 3$ and $f \circ g(x) = 4x + 11$

   b. $f(x) = \sqrt{x + 1}$ and $f \circ g(x) = \sqrt{-2x + 2}$

   c. $f(x) = 2x + 5$ and $f \circ g(x) = x + 5$

   d. $f(x) = \frac{3}{x+1}$ and $f \circ g(x) = \frac{3x}{x+1}$