Math 1060Q Name: _____

(De)Composition of Functions

Composing functions

1. Let $f(x) = 2x^2$ and $g(x) = x + 3$. Find the following values:

   (a) $(f \circ g)(-1)$

   (b) $(g \circ f)(-1)$

   (c) $(g \circ g)(2)$

2. Suppose $f(1) = 2$, $f(0) = 5$, $g(2) = 6$, g(3)=7, and $g(-3) = 0$. Find the following values:

   (a) $(f \circ g)(-3)$

   (b) $(g \circ f)(1)$

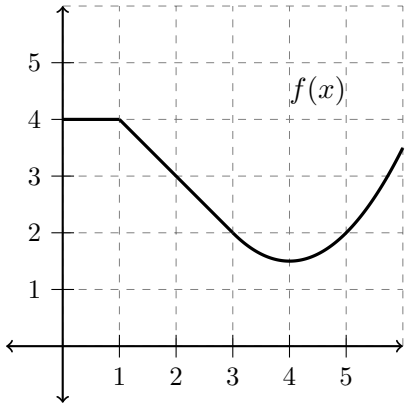
3. Suppose f is the function that takes a number and doubles it and g is the function that adds 1 to a number and then squares that sum. Find the following values:

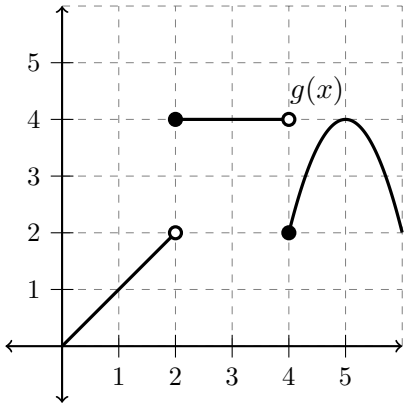
(a) $(f \circ g)(1)$

(b) $(g \circ f)(-2)$

(c) $(f \circ f)(3)$

4. Let $f(x)$ and $g(x)$ be functions defined on [0,5] with the graphs shown below. Use the graphs to evaluate the following:





(a) $(f \circ g)(1)$

(b) $(f \circ f)(2)$

(c) $(g \circ f)(5)$

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

   (a) $f \circ g$

   (b) $g \circ f$

   (c) $g \circ g$

6. Let $f(x) = \dfrac{1}{x+1}$ and $g(x) = \dfrac{1}{x-1}$.

   (a) What is $f \circ g$?

   (b) Is -1 in the domain of $f \circ g$?

(c) Is 0 in the domain of $f \circ g$?

Decomposing functions

Find two functions, f and g, such that $h(x) = (f \circ g)(x)$.

1. $h(x) = 5x + 6$

2. $h(x) = \dfrac{1}{x^2 + 1}$

3. $h(x) = x + \frac{1}{x}$

4. $h(x) = \frac{1}{x} - 1$

5. Find *three* functions whose composition is $h(x) = \dfrac{2}{\sqrt{x^2 + 1} - 3}$. Can you find four? Five?