Restrictions on Composite Functions

These notes are intended as a summary of section 4.4 (p. 307 – 314) in your workbook. You should also read the section for more complete explanations and additional examples.

Graphing Composite Functions

Given the equations of two functions, the composition of the two functions can be graphed using one of two methods:

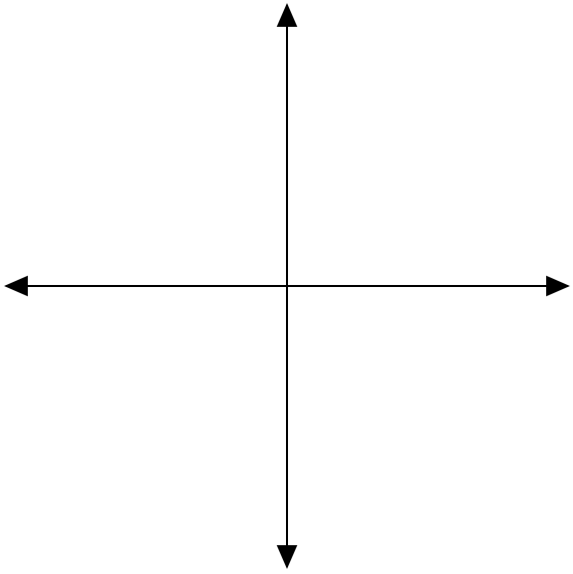
1. Determine an explicit equation for the composition and see if it is something you already know how to graph.

2. Use data tables to determine points and then plot the points to draw the graph.

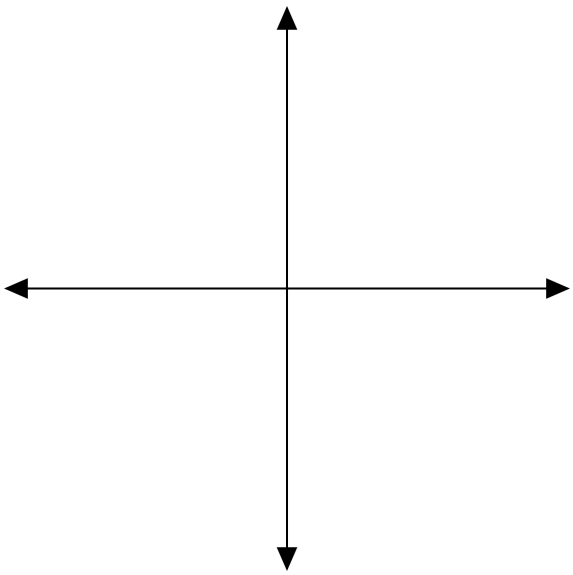
Example 1 (sidebar p. 308)
Use the functions $f(x) = x + 1$ and $g(x) = 4 - x^2$.

- State the domain and range of each function.
- Sketch a graph of each composite function below.
- State the domain and range of each composite function.

a) $y = f(g(x))$



b) $y = f\left(f\left(x\right)\right)$



Determining the Domain of a Composite Function

The domain of a composite function can be found in several ways:

1. If you have the graph, you can use it to determine the domain by inspection.

2. If you do not have the graph, then write an explicit equation for the composite function and determine any NPVs.

Example 2 (sidebar p. 311)
Given the functions

$$f(x)=\frac{1}{x+3} \quad \text{and} \quad g(x)=x^2-4x$$

determine an explicit equation for each composite function below, then state its domain.

a) $g(f(x))$

b) $f(g(x))$

Example 3 (sidebar p. 312)
Given the functions

$$f(x)=\sqrt{x} \qquad \text{and} \qquad g(x)=x^2-4$$

determine an explicit equation for each composite function below, then state its domain.

a) $g(f(x))$

b) $f(g(x))$

Example 4 (sidebar p. 313)

For each function, determine possible functions f and g so that $y = f\left(g\left(x\right)\right)$.

a) $y = \left(x - 2\right)^3$

b) $y = \sqrt{3 + x}$

Homework: #3, 4, 6, 7. 9, 10 in the section 4.4 exercises (p. 314 – 321). Answers on p. 322.