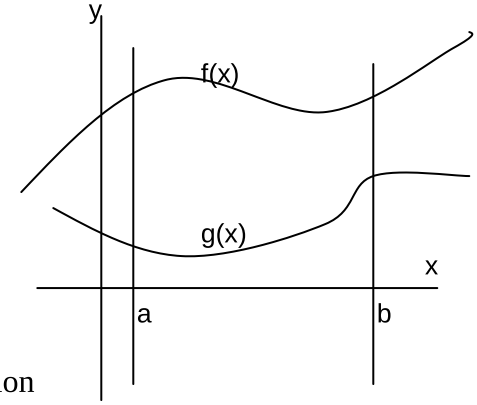
MA 160 Dr. Katiraie Areas Between Curves
Section 6.1



1. Let f and g be functions whose graphs are shown.

(a) Write an integral which represents the area of the region between the graph of f(x) and the x-axis on the interval [a, b].

(b) Write an integral which represents the area of the region between the graph of g(x) and the x-axis on the interval [a, b].

(c) Combine the two integrals in parts (a) and (b) to write an expression which represents the area of the region between the graphs of f(x) and g(x) on the interval [a, b]. Rewrite this as a single integral.

2.

(a) Sketch a graph of the functions $y = x^2 + 4$ and $y = x + 1$ on [1, 5].

(b) Set up an integral which represents the area of the region between $y = x^2 + 4$ and $y = x + 1$ on [1, 5].

(c) Evaluate the integral that you set up in part (b).

OVER→

3. Suppose that the region in #2 is ***lowered*** 6 units so that the new boundaries are $y = x^2 + 4 - 6 = x^2 - 2$ and $y = x + 1 - 6 = x - 5$. Sketch the graph of these functions on [1, 5]. Do you think that the value of the area of the region between the two curves on [1, 5] will change? Confirm your answer by setting up and simplifying an integral which represents the area of this new region.

4. In general, what must be true about functions f and g so that $\int_a^b [f(x) - g(x)]\,dx$ represents the value of the area of the region between the graphs of f and g on the interval [a, b]?

5. In this problem, you are going to find the area of the region between the graphs of the functions $y = 9 - x^2$ and $y = x + 3$. To solve this problem,

(a) Since no boundary points are given, you must first find the points of intersection of the graphs of the functions. To do this, set the two functions equal and solve for x.

(b) Sketch a graph of the two curves on the same coordinate system so you can see what the region looks like.

(c) Set up an integral which represents the value of the area of the given region and then evaluate this integral to answer the question.