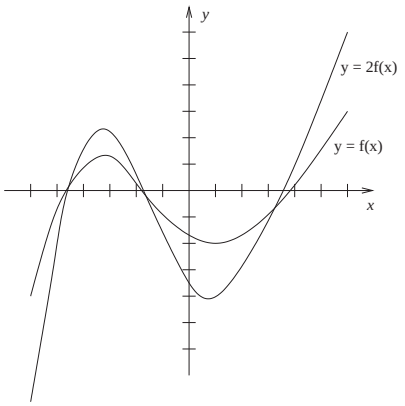
MATH 103 Pre-Calculus Mathematics
Quiz #5 Fall 2008
Sample Solutions

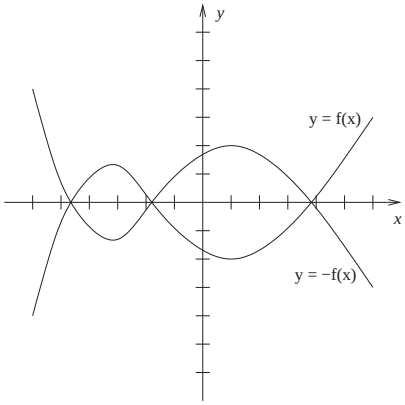
1. Below is a graph of function f. Using the same space, sketch the graph of $g(x) = 2 \cdot f(x)$.

Solution: For every point (x_1, y_1) appearing on the graph of f, the point $(x_1, 2 \cdot y_1)$ should appear on the graph of g. In particular, anywhere that f's graph hits the x-axis, so should g's. (Note that the graph of g shown below is not entirely accurate, but it is fairly close.)



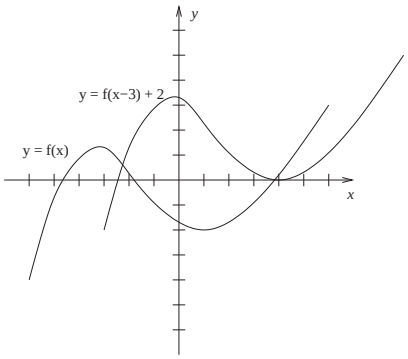
2. Below is a graph of function f. Using the same space, sketch the graph of $g(x) = -f(x)$.

Solution: For every point (x_1, y_1) appearing on the graph of f, the point $(x_1, -y_1)$ should appear on the graph of g. In particular, anywhere that f's graph hits the x-axis, so should g's. More generally, the graph of g is what results from reflecting f's graph about the x-axis.



3. Below is a graph of function f. Using the same space, sketch the graph of $g(x) = f(x-3)+2$.

Solution: To get the graph of g, shift the graph of f three units to the right and two units up. In other words, for every point (x_1, y_1) appearing on the graph of f, the point $(x_1 + 3, y_1 + 2)$ should appear on the graph of g.



4. Let $h(x) = (x - 2)(x - 1)$. Describe functions f and g such that $h = (f + g)$.

Solution: By multiplying, we get $h(x) = x^2 - 3x + 2$. Now it is simply a matter of choosing f and g so that $f(x) + g(x) = x^2 - 3x + 2$. There are infinitely many ways of doing that! Here are but a few:

Choose $f(x) = x^2$ and $g(x) = -3x + 2$.
Choose $f(x) = x^2 - 3x$ and $g(x) = 2$.
Choose $f(x) = x^2 + 4$ and $g(x) = -3x - 2$.
Choose $f(x) = (x^2 - 3x + 2)/2$ and $g(x) = (x^2 - 3x + 2)/2$.
Choose $f(x) = 0$ and $g(x) = x^2 - 3x + 2$ (the smart-aleck answer).

5. Let $h(x) = x^2 - 3x + 2$. Describe functions f and g such that $h = (f \cdot g)$.

Solution: Note that h is the same function as given in the previous problem, so we know (or could have figured out by factoring) that $h(x) = (x - 2)(x - 1)$. This suggests the following solution:
Choose $f(x) = x - 2$ and $g(x) = x - 1$.

The smart-aleck solution would be
Choose $f(x) = (x - 2)(x - 1)$ and $g(x) = 1$.