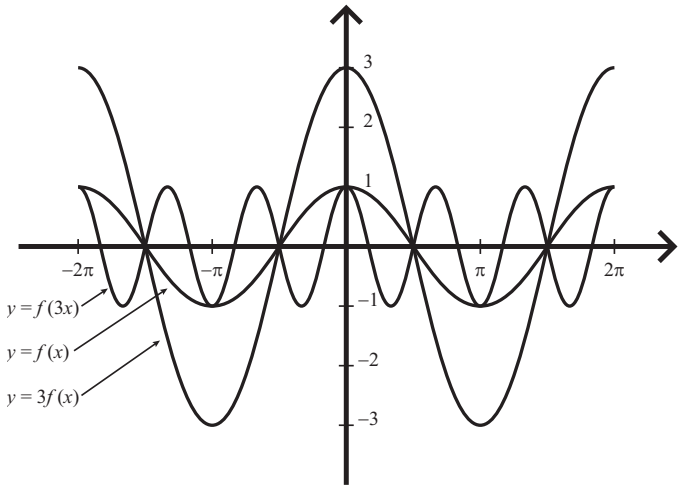
Math 151
In-class Worksheet
Numerical Solutions

1. (a) $y - 2 = \frac{1}{2}(x - 3)$, or equivalently, $y = \frac{1}{2}x + \frac{1}{2}$
   (b) $y = 6(x + 2) = 6x + 12$
   (c) $y - 3 = \frac{3}{5}(x + 1)$, or equivalently, $y = \frac{3}{5}x + \frac{18}{5}$

2. (a) $f \circ g(5) = f(g(5)) = f(0) = 1$
   (b) $g \circ f(\pi/2) = g(f(\pi/2)) = g(0) = -5$
   (c) The graphs are:



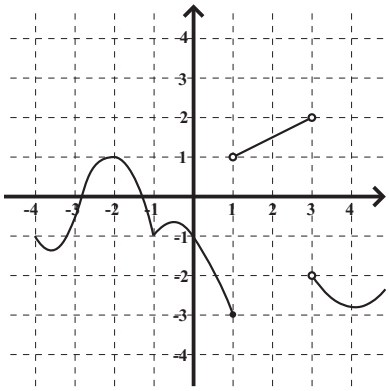
3. Find the following limits.

   (a) $\lim_{x \to -1} \dfrac{x^2 + 2x + 1}{x^2 - 5} = 0$

   (b) $\lim_{x \to 3^+} \dfrac{x^2 - x - 6}{x^2 - 5x + 6} = 5$

   (c) $\lim_{x \to 3^-} \dfrac{x + 2}{x - 3} = -\infty$

   (d) $\lim_{z \to 4} \dfrac{4 - z}{2 - \sqrt{z}} = 4$



4. Above is the graph of the function $g(x)$. Find the following limits.

   (a) $\lim_{x\to 3} g(x)$ does not exist

   (b) $\lim_{x\to 3} (g(x))^2 = 4$

   (c) $\lim_{x\to -1} g(x) = -1$

   (d) $\lim_{x\to -1^-} g(x^2) = 1$

   The tricky part here is that as x approaches -1 from the left, x^2 approaches 1 from the right.

   (e) $\lim_{t\to 2} \dfrac{g(t) - \frac{3}{2}}{t-2} = \frac{1}{2}$

   This limit computes the slope of the graph of $g(x)$ at $x = 2$.

   (f) $\lim_{t\to -2} \dfrac{g(t) - 1}{t+2} = 0$

   This limit computes the slope of the graph of $g(x)$ at $x = -2$.

5. Suppose a car is moving, and at time t measured in seconds, the car's position is $p(t) = 4t + t^2$ in feet.

   (a) What is the car's average velocity between $t = 3$ sec and $t = 4$ sec?

   11 ft/s

   (b) What is the car's average velocity between $t = 2.9$ sec and $t = 3$ sec?

   $0.99/0.1 = 9.9$ ft/s

   (c) Without using formulas from physics or calculus, how would you figure out the velocity of the car *at* $t = 3$ sec? Implement this method.

   Velocity at $3 = \lim_{t\to 3} \dfrac{4t + t^2 - 21}{t-3} = \lim_{t\to 3} t + 7 = 10$ ft/s.