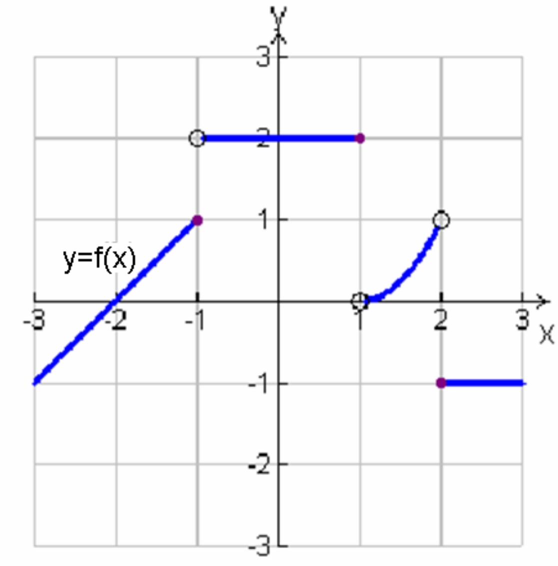
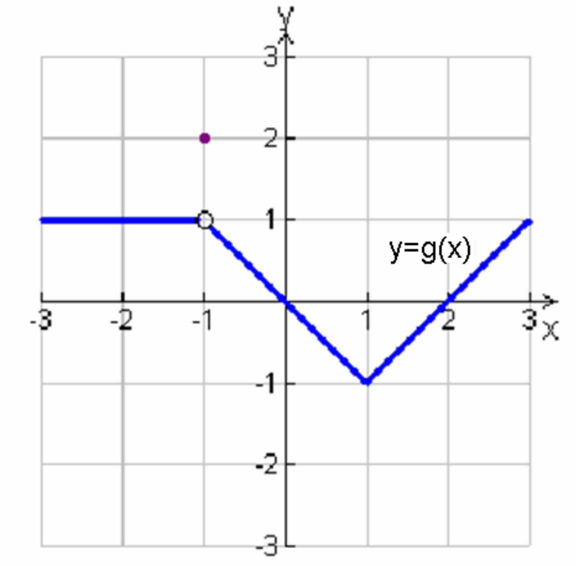
Math 1426 **Lab 2**
Spring 2006 **For week beginning 1-23-06**

Use the graphs of the functions *f* and *g* given below to answer questions 1 and 2.





1. Find each of the following limits, ***explaining your reasoning.*** If a limit does not exist, explain why.
   a. $\lim_{x\to -1} f(x)$
   b. $\lim_{x\to 1} f(x)$
   c. $\lim_{x\to -1} g(x)$
   d. $\lim_{x\to 1} g(x)$
   e. $\lim_{x\to -1}\left[f(x)+g(x)\right]$
   f. $\lim_{x\to 0}\left[2f(x)+3g(x)\right]$
   g. $\lim_{x\to -1}\left[f(x)g(x)\right]$
   h. $\lim_{x\to 2}\left[f(x)g(x)\right]$
   i. $\lim_{x\to 0}\left[\dfrac{f(x)}{g(x)}\right]$
   j. $\lim_{x\to 0}\left[\dfrac{g(x)}{f(x)}\right]$
   k. $\lim_{x\to -2} g\left(f(x)\right)$
   l. $\lim_{x\to -1} f\left(g(x)\right)$

2. For each of the limits in problem (1) that did not exist, determine whether the one-sided limits exist. Find each one-sided limit that exists, ***explaining your reasoning***. If a one-sided limit does not exist, explain why.

3. Sketch a graph of each of the functions h, v, and s that satisfy the following conditions.
   a. $\lim_{x\to 5} h(x) = 10$ but $h(5)$ is not defined
   b. $\lim_{x\to 2} v(x) = 3$ but $v(2) \neq 3$
   c. $\lim_{x\to 0} s(x)$ does not exist but $s(0) = 2$

4. Sketch of a graph of a function which satisfies the given properties.
   a. $\lim_{x\to 0} f(x) = 0$, $f(0) = 10$, $\lim_{x\to 1^+} f(x) = -1$, $\lim_{x\to 1^-} f(x) = 1$, $f(1) = 0$
   b. $\lim_{x\to 2^-} g(x) = +\infty$, $\lim_{x\to 2^+} g(x) = -\infty$
   c. $\lim_{x\to n^-} h(x) = n$ and $h(n) = n+1$ for every integer n