Math 142
Spring, 2005 Name: **Solutions**
Quiz 3 - §§1.1, 1.2

Complete the following problems. Show all work to receive full credit.

Find the following limits:

1. If $\lim_{x\to 0} f(x) = 1$ and $\lim_{x\to 0} g(x) = -5$, find

   (a) $\lim\limits_{x\to 0} xf(x)$

   $$\left(\lim_{x\to 0} x\right)\left(\lim_{x\to 0} f(x)\right) = 0 \cdot 1 = \boxed{0}$$

   (b) $\lim\limits_{x\to 0} \dfrac{g(x)}{f(x)-1}$

   $$= \frac{\lim_{x\to 0} g(x)}{\lim_{x\to 0}(f(x)-1)}$$
   $$= \frac{-5}{1-1} = \frac{-5}{0}$$

   Oops - I changed numbers and this doesn't work. Sorry.

2. Find $\lim\limits_{y\to -3}(5-y)^{\frac{4}{3}}$

   $$= (5-(-3))^{\frac{4}{3}} = (8)^{\frac{4}{3}} = \left(8^{\frac{1}{3}}\right)^4 = 2^4 = \boxed{16}$$

3. Find $\lim\limits_{x\to -2^+}(x+3)\dfrac{|\,x+2\,|}{x+2}$

   Remember that

   $$|\,x+2\,| = \begin{cases} x+2 & x \geq -2 \\ -(x+2) & x < 2 \end{cases}$$

   Since we are getting close to -2 from the right, we always use the first rule, so we have:

   $$\lim_{x\to -2^+}(x+3)\frac{|\,x+2\,|}{x+2} = \lim_{x\to -2^+}(x+3)\frac{x+2}{x+2} = \lim_{x\to -2^+} x+3 = -2+3 = \boxed{1}$$