Math 211 Section C, QUIZ 2 Solutions Friday, 1/24/03

1. (5 pts; p113 #21) $\lim_{x\to 2} \dfrac{3x^2-4x+2}{7x^2-5x+3} = \dfrac{3(2)^2-4(2)+2}{7(2)^2-5(2)+3} = \dfrac{6}{21} = \dfrac{2}{7}$

2. (5 pts; p113 #21) $\lim_{x\to 2} \dfrac{x^2+x-6}{x^2-4} = \lim_{x\to 2} \dfrac{(x-2)(x+3)}{(x-2)(x+2)} = \lim_{x\to 2} \dfrac{x+3}{x+2} = \dfrac{5}{4}$

3. $\lim_{h\to 0} \dfrac{2xh+h^2}{h} = \lim_{h\to 0} \dfrac{h(2x+h)}{h} = \lim_{h\to 0}(2x+h) = 2x+0 = 2x$

4. $\lim_{h\to 0} \dfrac{(x+h)^2-x^2}{h} = \lim_{h\to 0} \dfrac{x^2+2xh+h^2-x^2}{h} = \lim_{h\to 0} \dfrac{2xh+h^2}{h} = 2x$ (see #3 for the last step)

Math 211 Section C, QUIZ 3 Solutions Friday, 1/31/03

1. (5 pts; p148 #32) Find $f'(x)$ for $f(x) = -0.01x^2 - 0.4x + 50$. $f'(x) = -.02x - .4$

2. (5 pts; p148 #20) $\dfrac{d}{dx}\left(\sqrt[5]{x} - \dfrac{2}{x}\right) = \dfrac{d}{dx}\left(x^{1/5} - 2x^{-1}\right) = \frac{1}{5}x^{1/5-5/5} + (-2)(-2)x^{-1-1} = \frac{1}{5}x^{-4/5} + 2x^{-2}$

3. (a) (5 pts; p137 #20) Use the definition $f'(x) = \lim_{h\to 0} \dfrac{f(x+h)-f(x)}{h}$ to find $f'(x)$ for $f(x) = \dfrac{2}{x}$.

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h} = \lim_{h\to 0} \frac{\frac{2}{x+h} - \frac{2}{x}}{h} = \lim_{h\to 0} \frac{1}{h}\left[\frac{2}{x+h} - \frac{2}{x}\right] = \lim_{h\to 0} \frac{1}{h}\left[\frac{2x}{x(x+h)} - \frac{2(x+h)}{x(x+h)}\right]$$
$$= \lim_{h\to 0} \frac{1}{h}\left[\frac{2x-2x-2h}{x(x+h)}\right] = \lim_{h\to 0} \frac{2h}{hx(x+h)} = \lim_{h\to 0} \frac{2}{x(x+h)} = \frac{2}{x(x+0)} = \frac{2}{x^2}$$

3. (b) (5 pts; p137 #20) Find an equation of the tangent line to the graph of $f(x) = \dfrac{2}{x}$ at the point $(2, 1)$.

Either from the definition (in 3(a)) or from the formulas (in 2), we have $f'(x) = \dfrac{2}{x^2}$.

We will use the formula $y = m(x-a)+b$, which gives an equation of the line with slope m through the point (a, b). The slope of the tangent line at $(2, 1)$ is $f'(2) = \dfrac{1}{2^2} = \dfrac{1}{4}$, so the equation of the tangent line is $y = \dfrac{1}{4}(x-2)+1$.