MATH 211 QUIZ 5 NAME SOLUTIONS

Prof. J. Beachy Friday, 10/4/02 Circle C1(T10) C2(T11) C3(Th11)

1. (5 pts; p 163 #33) **Use the quotient rule** to find the derivative of $f(x) = \dfrac{3x^2+2x}{x^2+1}$.

I prefer to write the quotient rule as $\dfrac{d}{dx}\left[\dfrac{u(x)}{v(x)}\right] = \dfrac{u'(x)v(x)-u(x)v'(x)}{v(x)^2}$

$$f'(x) = \frac{(6x+2)(x^2+1)-(3x^2+2x)(2x)}{(x^2+1)^2}$$

2. (5 pts; p 172 #74) Find the derivative of $s = \sqrt[4]{t^4+3t^2+8}$.

We need to use the general power rule $\dfrac{d}{dx}u(x)^n = n \cdot u(x)^{n-1} \cdot u'(x)$.

$s = \sqrt[4]{t^4+3t^2+8} = (t^4+3t^2+8)^{1/4}$.

$$\frac{ds}{dt} = \frac{1}{4}(t^4+3t^2+8)^{-3/4}(4t^3+6t)$$

3. (5 pts; p 172 #47) Find an equation for the tangent line to the graph of $y = \sqrt{x^2+3x}$ when $x = 1$.

$y = \sqrt{x^2+3x} = (x^2+3x)^{1/2}$

$$\frac{dy}{dx} = \frac{1}{2}(x^2+3x)^{-1/2}(2x+3) = \frac{2x+3}{2\sqrt{x^2+3x}}$$

When $x = 1$, we get $\dfrac{dy}{dx} = \dfrac{2(1)+3}{2\sqrt{1+3}} = \dfrac{5}{2\sqrt{4}} = \dfrac{5}{4}$. This gives the slope of the tangent line when $x = 1$.

When $x = 1$, we have $y = 2$, so the tangent line is $y = \dfrac{5}{4}(x-1)+2$.

4. (5 pts; p 177 #44) Find $f''(x)$ for $f(x) = \dfrac{1}{\sqrt{x-1}}$.

$f(x) = (x-1)^{-1/2}$

$$f'(x) = -\frac{1}{2}(x-1)^{-3/2}(1) = -\frac{1}{2}(x-1)^{-3/2}$$

$$f''(x) = (-\frac{1}{2})(-\frac{3}{2})(x-1)^{-5/2}(1) = \frac{3}{4}(x-1)^{-5/2}$$