Name: Key

Circle One:

11:00-11:55 (325)

3:30-4:20 (333)

Math211-2, Fall 2007
Quiz #4: 10–17–07
No Calculators. There are four problems.

1. (3 Points) Find $\frac{dy}{dx}$ in terms of x and y for the following equation: $y^2 + ye^{2x} + e^x = x$.

product rule

$$2y\frac{dy}{dx} + y(2e^{2x}) + \frac{dy}{dx}e^{2x} + e^x = 1$$

$$\frac{dy}{dx}\left[2y + e^{2x}\right] = 1 - 2ye^{2x} - e^x$$

$$\boxed{\frac{dy}{dx} = \frac{1 - 2ye^{2x} - e^x}{2y + e^{2x}}}$$

2. (3 Points) For $f(x) = \frac{2x}{x^2+1}$, find all the critical points and determine where the function is increasing/decreasing.

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

Crit pts when $f'(x)=0$, or when $1-x^2=0$, $x=\pm 1$. (x^2+1 is never 0)

$f'(0) = 2$

$f'(2) = (\text{positive})(-3) < 0$

$f'(-2) = (\text{positive})(-3) < 0$

x		-1		1	
$f'(x)$	$-$	0	$+$	0	$-$

Increasing on $(-1,1)$.

Decreasing on $(-\infty,-1) \cup (1,\infty)$

3. (3 Points) Determine where the graph of the function defined by

$$f(x) = 2x^3 + 6x^2 - 5x + 1$$

is concave up, concave down, and where there are any inflection points, if any.

$f'(x) = 6x^2 + 12x - 5$

$f''(x) = 12x + 12$.

Possible pts of inflection when $12x+12=0$, or at $x=-1$

$f''(0) = 12 > 0$

$f''(-2) = -12 < 0$

x		-1	
$f''(x)$	$--$	0	$++$
$f(x)$	$\cap$		$\cup$

$x=-1$ is a point of inflection.

4. (Bonus) (1 Point) Why did Wisconsin lose to Penn State last Saturday?

Our defense needs to step it up.