Math 1A (7:30am – 8:20am)
Quiz 4
Fri Oct 24, 2008

SCORE: ___ / 20 POINTS

What day of the month is your birthday ? ___ ___
What are the last 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your social security number ? ___ ___
[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER, USE YOUR STUDENT ID NUMBER]

NO CALCULATORS ALLOWED

Find the derivatives of the following functions. **SCORE: ___ / 8 POINTS**
FOR 1 BONUS POINT EACH, SIMPLIFY YOUR ANSWERS.

[a] $f(x) = \dfrac{x^2}{\sqrt{x^3+1}}$

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

$$= \frac{2x(x^3+1) - \frac{3}{2}x^4}{(x^3+1)^{\frac{3}{2}}}$$

$$= \frac{4x(x^3+1) - 3x^4}{2(x^3+1)^{\frac{3}{2}}}$$

$$= \frac{x^4+4x}{2(x^3+1)^{\frac{3}{2}}}$$

[b] $f(x) = (x+2)^5(x^2+4)^4$

$$f'(x) = 5(x+2)^4(x^2+4)^4 + (x+2)^5 4(x^2+4)^3(2x)$$

$$= (x+2)^4(x^2+4)^3\left(5(x^2+4) + 8x(x+2)\right)$$

$$= (x+2)^4(x^2+4)^3(13x^2+16x+20)$$

Find the derivative of $\dfrac{1}{1+[f(x)]^2}$, where $f(x)$ is an unspecified differentiable function **SCORE: ___ / 4 POINTS**

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

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

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

Find the derivative of $(3x^3+7x-6)(8x^2-x-5)(4x^3-2x^2+9)$. **SCORE: ___ / 3 POINTS**

DO NOT SIMPLIFY YOUR ANSWER.

$(9x^2+7)(8x^2-x-5)(4x^3-2x^2+9)$ 1

$+\ (3x^3+7x-6)(16x-1)(4x^3-2x^2+9)$ 1

$+\ (3x^3+7x-6)(8x^2-x-5)(12x^2-4x)$ 1

The following table gives the function and derivative values of two differentiable functions $f(x)$ and $g(x)$ for various input values. **SCORE: ___ / 5 POINTS**

x	0	1	2	3	4	5
$f(x)$	3	0	5	1	2	4
$f'(x)$	5	2	3	4	6	1
$g(x)$	1	5	4	2	0	3
$g'(x)$	1	4	5	6	3	2

[a] If $k(x)=g(f(x))$, find the slope of the tangent line to $y=k(x)$ at $x=0$.

$k'(x)=g'(f(x))\cdot f'(x)$

$k'(0)=g'(f(0))\cdot f'(0)$

$=g'(3)\cdot 5$ 1

$=6\cdot 5$

$=30$ 1

[b] If $w(x)=\sqrt{x}f(x)$, find the slope of the tangent line to $y=w(x)$ at $x=4$.

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

$w'(4)=\frac{1}{2}4^{-\frac{1}{2}}f(4)+\sqrt{4}f'(4)$

$=\frac{1}{4}\cdot 2+2\cdot 6$ 1

$=3\frac{1}{2}$ $\frac{1}{2}$