Math 1A (7:30am – 8:20am)
Quiz 5 Version A
Fri Oct 29, 2010

NAME YOU ASKED TO BE CALLED: _____

SCORE: ___ / 30 POINTS

NO CALCULATORS ALLOWED
SHOW PROPER WORK / USE PROPER NOTATION / SIMPLIFY YOUR ANSWERS

Find the slope of the tangent line to $1-2x^2y^3=(x^2+y^3)^2$ at $(2,-1)$. SCORE: ___ / 5 POINTS

$$-4xy^3-6x^2y^2\frac{dy}{dx}=2(x^2+y^3)(2x+3y^2\frac{dy}{dx})$$

$$-4(2)(-1)^3-6(2)^2(-1)^2\frac{dy}{dx}\Big|_{(2,-1)}=2(2^2+(-1)^3)(2(2)+3(-1)^2\frac{dy}{dx}\Big|_{(2,-1)})$$

$$8-24\frac{dy}{dx}\Big|_{(2,-1)}=6(4+3\frac{dy}{dx}\Big|_{(2,-1)})$$

$$8-24\frac{dy}{dx}\Big|_{(2,-1)}=24+18\frac{dy}{dx}\Big|_{(2,-1)}$$

$$-16=42\frac{dy}{dx}\Big|_{(2,-1)}\longrightarrow \frac{dy}{dx}\Big|_{(2,-1)}=\frac{-8}{21}$$

If $f(x)=(1+2x)^{\tan x}$, find $f'(x)$. SCORE: ___ / 5 POINTS

$$\ln f(x)=\tan x\ln(1+2x)$$

$$\frac{f'(x)}{f(x)}=\sec^2x\ln(1+2x)+\tan x\cdot\frac{2}{1+2x}$$

$$f'(x)=f(x)\left(\sec^2x\ln(1+2x)+\frac{2\tan x}{1+2x}\right)$$

$$=(1+2x)^{\tan x}\left(\sec^2x\ln(1+2x)+\frac{2\tan x}{1+2x}\right)$$

$$=(1+2x)^{\tan x-1}\left((1+2x)\sec^2x\ln(1+2x)+2\tan x\right)$$

If $f(x)=(5-2x)^3(1-x^2)^{-2}$, find $f'(x)$. Your final answer should be in factored simplified form. SCORE: ___ / 5 POINTS

$$f'(x)=3(5-2x)^2(-2)(1-x^2)^{-2}+(5-2x)^3(-2)(1-x^2)^{-3}(-2x)$$

$$=-2(5-2x)^2(1-x^2)^{-3}\left[3(1-x^2)-2x(5-2x)\right]$$

$$=-2(5-2x)^2(1-x^2)^{-3}\left[3-10x+x^2\right]$$

The table below shows values of $f(x)$, $f'(x)$, $g(x)$ and $g'(x)$ for several values of x. **SCORE: ___ / 4 POINTS**

If $h(x) = g(f(x))$, find $h'(1)$.

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

$h'(x) = g'(f(x))f'(x)$

$h'(1) = g'(f(1))f'(1)$

$= g'(3)(-3)$

$= (-1)(-3) = 3$

The amount you pay for car insurance every year depends on how many miles you drive each day. If $p = f(d)$, **SCORE: ___ / 3 POINTS**

where p is your yearly payment (in dollars), and v is your daily driving (in miles), what does the statement $f'(20) = 3$ mean?

Give the units of measurement for each number in your answer.

NOTE: Your answer should NOT include "derivative", "instantaneous", "rate of change", "with respect to", "slope" or "tangent line".

IF YOU DRIVE 20 MILES A DAY,
YOUR YEARLY CAR INSURANCE WILL INCREASE $3
FOR EACH ADDITIONAL MILE YOU DRIVE EACH DAY

Find $\frac{d}{dx}\sin^{-1}\sqrt{x}$. **SCORE: ___ / 4 POINTS**

$$\frac{1}{\sqrt{1-\sqrt{x}^2}} \cdot \frac{1}{2\sqrt{x}} = \frac{1}{2\sqrt{x}\sqrt{1-x}}$$

Prove that $\frac{d}{dx}\tan^{-1} x = \frac{1}{1+x^2}$. **SCORE: ___ / 4 POINTS**

$y = \tan^{-1} x$

$\tan y = x$

$\sec^2 y \frac{dy}{dx} = 1$

$$\frac{dy}{dx} = \frac{1}{\sec^2 y} = \frac{1}{1+\tan^2 y} = \frac{1}{1+x^2}$$