Math 1A (7:30am – 8:20am)
Group Quiz 5
Wed Oct 29, 2008

Group Members' Names: ______________________

SCORE: ___ / 10 POINTS

NO CALCULATORS ALLOWED

Prove that $\frac{d}{dx}\cos x = -\sin x$ from the definition of the derivative. **SCORE: ___ / 3 POINTS**

You may use the two **limits** proved in class without reproving them.

$$\frac{d}{dx}\cos x = \lim_{h\to 0}\frac{\cos(x+h)-\cos x}{h} \quad \tfrac{1}{2}$$

$$= \lim_{h\to 0}\frac{\cos x\cos h - \sin x \sin h - \cos x}{h} \quad \tfrac{1}{2}$$

$$= \lim_{h\to 0}\left(\cos x\frac{\cos h - 1}{h} - \sin x\frac{\sin h}{h}\right) \quad 1$$

$$\overset{1}{=} 0\cdot\cos x - 1\cdot\sin x = -\sin x$$

Find the derivatives of the function $f(x) = 5^{\tan 4x}$. **SIMPLIFY YOUR ANSWER.** **SCORE: ___ / 2 POINTS**

$$f'(x) = 5^{\tan 4x}(\ln 5)(\sec^2 4x)(4)$$

$$= \underbrace{(4}\,\underbrace{\ln 5)}\,\underbrace{5^{\tan 4x}}\,\underbrace{\sec^2 4x}$$

$\frac{1}{2}$ POINT EACH

If $g(x)$ is the inverse of $f(x) = x^3 + x - 3$, find $g'(7)$. **SCORE: ___ / 2 POINTS**

$\frac{1}{2}$ $f(2) = 2^3 + 2 - 3 = 7$ $\qquad f'(x) = 3x^2 + 1$ $\frac{1}{2}$

so $g(7) = 2$

so $g'(7) = \frac{1}{f'(2)}$ $\frac{1}{2}$ $= \frac{1}{3(2)^2+1} = \frac{1}{13}$ $\frac{1}{2}$

If $f(x) = \cos x$, find $f^{(75)}(x)$. You must explain why your answer is correct. **SCORE: ___ / 3 POINTS**

$f(x) = \cos x$ $\qquad f^{(4)}(x) = \cos x$ 1 $\qquad f^{(8)}(x) = \cos x$

$f'(x) = -\sin x$ $\qquad f^{(5)}(x) = -\sin x$ $\qquad$ ETC.

$f''(x) = -\cos x$ $\qquad f^{(6)}(x) = -\cos x$

$f'''(x) = \sin x$ $\qquad f^{(7)}(x) = \sin x$

1

CYCLE OF DERIVATIVES REPEATS EVERY 4^{TH} TIME

$f^{(72)}(x) = f(x)$

$f^{(75)}(x) = f'''(x) = \sin x$ 1