MATH 131 EXAMINATION II FALL 2003

NAME _____ ID NUMBER_____

This exam should have 16 questions . Part I will have 12 multiple choice questions , 5 points each . Part II will have 4 handgraded questions , 10 points each . Please check to see that your exam is complete . If you do not have a **PENCIL** to mark your card , please ask to borrow one from your proctor .

Write your **ID NUMBER** (not your SS number) on the six blank lines at the top of your answer card , using one blank for each digit . Then **shade in the corresponding boxes below .** Also **print your name** at the top of your card .

As you work the exam , lightly shade in the correct answers on your answer card . At the end of your exam , when you are certain of all your choices , **darken** all your answer boxes . If your card becomes damaged please ask your proctor for a new one .

PART I : (60 points) .

1) Find an equation of the tangent line to the curve $y = x \sin(x)$ at $(\frac{\pi}{2}, \frac{\pi}{2})$.

A) $x - y = 0$
B) $x + y = 0$
C) $2x - y = \frac{\pi}{2}$
D) $3x - y = \pi$
E) $x + 2y = \frac{3\pi}{2}$
F) $x - y = \frac{\pi}{2}$
G) $\pi x - \pi y = 2$
H) $2x + y = 1$
I) $x - 2y = -\frac{\pi}{2}$
J) $3x - 2y = \frac{\pi}{2}$

$y' = \sin(x) + x\cos(x)$

$x = \frac{\pi}{2}$: $m = y' = 1$

$y - \frac{\pi}{2} = 1\left(x - \frac{\pi}{2}\right)$

or

$y = x$

or

$\boxed{x - y = 0}$

2) If $f(x) = \sqrt[4]{1 + 2x + x^3}$ then $f'(0) =$:

A) 0 B) 1 (C) $\frac{1}{2}$ D) $\frac{1}{3}$ E) $\frac{1}{4}$ F) $\frac{3}{4}$ G) $-\frac{3}{4}$ H) $-\frac{1}{4}$ I) $-\frac{1}{3}$ J) $-\frac{1}{2}$

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

$$f'(0) = \frac{1}{4}(1)^{-3/4}(2) = \frac{1}{2}$$

3) Find an equation of the tangent line to the curve $xy + 2x + 3x^2 = 6$ at $(1, 1)$.

A) $6x + 3y = 9$
B) $3x + 6y = 9$
C) $7x + 3y = 10$
D) $5x - 2y = 3$
(E) $9x + y = 10$
F) $8x - y = 7$
G) $2x + 5y = 7$
H) $9x - 4y = 5$
I) $x + 9y = 10$
J) $2x + 3y = 5$

$$y + xy' + 2 + 6x = 0$$

$$(1,1): \quad 1 + y' + 2 + 6 = 0$$

$$y' = -9$$

$$y - 1 = -9(x - 1)$$

$$y - 1 = -9x + 9$$

$$\boxed{9x + y = 10}$$

4) Suppose a curve is given parametrically by $x = 2\sin(2t)$. $y = 2\sin(t)$, $-\frac{\pi}{2} \le t \le \frac{\pi}{2}$. Find the slope of the tangent line at the point $(0, 0)$.

A) 1 B) -1 C) 2 D) -2 E) 3 F) -3 G) $\frac{1}{2}$ H) $-\frac{1}{2}$ I) $\frac{1}{3}$ J) $-\frac{1}{3}$

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{2\cos(t)}{2\cos(2t)\cdot 2}$$

$$x=0 \;:\; \frac{dy}{dx} = \frac{2}{4} = \frac{1}{2}$$

5) What is the exact value of the product $(\log_5(25))(\log_3(\frac{1}{3}))(\ln(\sqrt{e}))$?

A) $\frac{1}{2}$ B) $-\frac{1}{2}$ C) 1 D) -1 E) $\frac{3}{2}$ F) $-\frac{3}{2}$ G) 2 H) -2 I) $\frac{5}{2}$ J) $-\frac{5}{2}$

$$= (\log_5(5^2))(\log_3(3^{-1}))(\ln(e^{1/2}))$$

$$= (2\log_5(5))(-\log_3(3))(\tfrac{1}{2}\ln(e))$$

$$= (2)(-1)(\tfrac{1}{2}) = -1$$