Practice Test

Chapter 3 Exam
A. P. Calculus
Mr. Lemay
November 3, 2008

Section I, Part A
Time-20 minutes Number of questions – 10
A CALCULATOR MAY NOT BE USED ON THIS PART OF THE EXAMINATION
(Worth 40% of Exam)

Directions: Solve each of the following problems, using the available space for scratch work. After examining the form of the choices, decide which is the best of the choices given. Clearly mark your selection.

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1. If $f(x)=(2x+1)^4$, then the 4th derivative of $f(x)$ at x = 0 is

(A) 0 (B) 24 (C) 48 (D) 240 (E) 384

$4(2x+1)^3 \cdot 2 \rightarrow 8(2x+1)^3$

$24(2x+1)^2 \cdot 2 \rightarrow 48(2x+1)^2$

$96(2x+1) \cdot 2 = 192(2x+1)$

$192(2x+1)^0 \cdot 2 =$

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2. If $y=\frac{3}{4+x^2}$, then $\frac{dy}{dx}=$ $3(4+x^2)^{-1}$ $-3(4+x^2)^{-2} \cdot 2x$ $\frac{-6x}{(4+x^2)^2}$

(A) $\frac{-6x}{(4+x^2)^2}$ (B) $\frac{3x}{(4+x^2)^2}$ (C) $\frac{6x}{(4+x^2)^2}$ (D) $\frac{-3}{(4+x^2)^2}$ (E) $\frac{3}{2x}$

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3.) If f(x) = x, then f'(5) =

a) 0 b) 1/5 c) 1 d) 5 e) 25/2

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4. The slope of the line tangent to the graph of $y = \ln\left(\frac{x}{2}\right)$ at x = 4 is

a) 1/8 b) ¼ c) ½ d) 1 e) 4

$\frac{1}{\frac{x}{2}} \cdot \frac{1}{2} \quad \frac{2}{x} \cdot \frac{1}{2} = \frac{1}{x}$

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5. If $y = 10^{(x^2-1)}$, then $\frac{dy}{dx} =$

(A) $(\ln 10)10^{(x^2-1)}$ (B) $(2x)10^{(x^2-1)}$ (C) $(x^2-1)10^{(x^2-2)}$ (D) $2x(\ln 10)10^{(x^2-1)}$ (E) $x^2(\ln 10)10^{(x^2-1)}$

$10^{x^2-1} \cdot \ln 10 \cdot 2x$

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6. The position of a particle moving along a straight line at any time t is given by $s(t) = t^2 + 4t + 4$. What is the acceleration of the particle when t =4?

(A) 0 (B) 2 (C) 4 (D) 8 (e) 12

$s'(t) = 2t + 4$

$s''(t) = 2$ for any t

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7. If $x^2 + xy + y^3 = 0$, then,, in terms of x and y, $\frac{dy}{dx} =$

(A) $-\frac{2x+y}{x+3y^2}$ (B) $-\frac{x+3y^2}{2x+y}$ (C) $\frac{-2x}{1+3y^2}$ (D) $\frac{-2x}{x+3y^2}$ (E) $-\frac{2x+y}{x+3y^2-1}$

$2x + x\frac{dy}{dx} + y + 3y^2\frac{dy}{dx} = 0$

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

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

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8. If $y = \cos^2 x - \sin^2 x$, then $\frac{dy}{dx} =$

(A) -1 (B) 0 (C) $-2\sin(2x)$ (D) $-2(\cos x + \sin x)$ (E) $2(\cos x - \sin x)$

$2\cos x(-\sin x) - 2\sin x \cdot \cos x$

~~$2\cos x($~~ $-2\sin x\cos x - 2\sin x\cos x$

$-4\sin x\cos x$

$-2\sin x(\cos x + \cos x)$ $-2(2\sin x\cos x)$

An identity: $-2\sin 2x$

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9) If $f(x) = e^x$, which of the following is equal to $f'(e)$?

a) $\lim_{h \to 0} \frac{e^{x+h}}{h}$

b) $\lim_{h \to 0} \frac{e^{x+h} - e^e}{h}$

c) $\lim_{h \to 0} \frac{e^{e+h} - e}{h}$

d) $\lim_{h \to 0} \frac{e^{x+h} - 1}{h}$

e) $\lim_{h \to 0} \frac{e^{e+h} - e^e}{h}$

$\lim_{h \to 0} \frac{e^{e+h} - e^e}{h}$

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10) Which of the following functions are continuous for all real numbers x?

I. $y = x^{\frac{2}{3}}$

II $y = e^x$

III $y = \tan x$

a) None b) I only c) II only d) I and II e) I and III

Practice

Section I, Part B
Time-9 minutes Number of questions – 3
A GRAPHING CALCULATOR IS REQUIRED FOR SOME QUESTIONS ON THIS PART OF THE EXAMINATION
(Worth 20% of Exam)

Directions: Solve each of the following problems, using the available space for scratch work. After examining the form of the choices, decide which is the best of the choices given. Clearly mark your selection.

1. A particle moves along a line so that at time t, where $0 \le t \le \pi$, its position is given by $s(t) = -4\cos t - \frac{t^2}{2} + 10$. What is the velocity of the particle when its acceleration is zero?

(A) -5.19 (B) 0.74 (C) 1.32 (D) 2.55 (E) 8.13

$s''(t) = 0$ @ 1.318

$s'(1.318) =$

2. Let f be the function given by $f(x) = 2e^{4x^2}$. For what value of x is the slope of the line tangent to the graph of f at $(x, f(x))$ equal to 3?

(A) 0.168 (B) 0.276 (C) 0.318 (D) 0.342 (E) 0.551

$f'(x) = 2e^{4x^2} \cdot 8x$

$3 = 16xe^{4x^2}$

3. Which of the following expressions does not have the same derivative as $y = \log_3 x$?

See now

Practice

a) $16 + \log_3 x$ b) $\log_3 4x$ c) $\frac{1}{2}\log_6 x$ d) $\frac{\ln x}{\ln 3}$ e) $\log_9 x^2, x > 0$

$\frac{1}{x \ln 3}$ $\frac{1}{x \ln 3}$ $\frac{1}{4x \ln 3} \cdot 4$ $\log_3 x$ $\frac{1}{x^2 \ln 9} \cdot 2x$

$\frac{1}{2} \cdot \frac{1}{x \ln 6}$ $\frac{2x}{2x^2 \ln 3}$

AP Calculus
Section II

Time 15 minutes Number of problems 3
Percent of total grade-40

A GRAPHING CALCULATOR IS REQUIRED FOR SOME PROBLEMS OR PARTS OF PROBLEMS ON THIS SECTION OF THE EXAMINATION.

REMEMBER TO SHOW YOUR SETUPS AS DESCRIBED IN THE GENERAL INSTRUCTIONS

1. Find the points on the graph of $y = \sin x$, $0 \le x \le 2\pi$, where the tangent is parallel to the line $4x - y = 7$.

$y = 4x - 7$

Slope $= 4$

$y' = \cos x$

$y' = 4$

never

$x - 4y = 7$

$y = \frac{1}{4}x - \frac{7}{4}$

$\cos x = \frac{1}{4}$

$x = 1.318$

$\pi - 1.$

$x = 4.965$

$\sin(1.318) = .968$

$\sin(4.965) = -.980$

$(1.318, 0.968)$

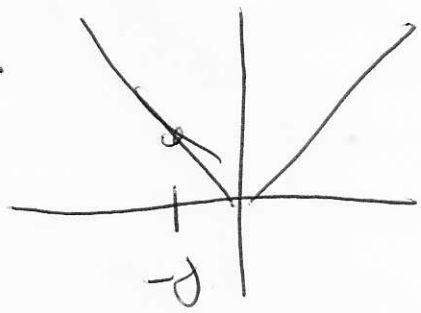
$(4.965, -0.980)$

2. Let $f(x)=|x|$.

a. Find NDER(f(x),x,-2). $= -1$

b. Is your answer to part (a) a meaningful estimate of a derivative of f(x)? Explain using ideas from calculus

yes because



The slope of $|x|$ @ $x=-2$ is -1

3. Suppose that u and v are differentiable at $x=2$ and that $u(2)=4$, $v(2)=-9$, $u'(2)=5$, $v'(2)=3$. Find:

a. $\frac{d}{dx}(6uv)$

$6(uv'+vu')$

$6(4(3)+-9(5))$

$6(12-45) = -198$

b. $\frac{d}{dx}\left(\frac{u}{v}\right)$

$\frac{vu'-uv'}{v^2}$ $\frac{-9(5)-4(3)}{81}$

$\frac{-45-12}{81} = \frac{-57}{81}$