King Fahd University of Petroleum And Minetals
Department of Mathematics and Statistics

Math 101- Term 073

Exam II

Tuesday, August 12, 2008

Allowed Time: 2 hours

CODE 001

Name:_____

ID #:_____ **Section #:**_____

Textbook: Stewart, J., Calculus: Early Transcendentals, 5th edition, 2003.

Materials: Sections 3.1 to 3.10.

Check that this Exam has **20 questions.**

Instructions:

1. Calculators and Mobiles are NOT allowed during this Exam.
2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT USE the eraser attached to the pencil.
4. Write your name, ID number and section number on the Exam paper and on the answer sheet.
5. Bubble your ID number and section number and make sure that the bubbles match with the numbers you wrote.
6. The TEST CODE NUMBER is already bubbled on your answer sheet. Make sure that it is the same as that printed on your Exam paper.
7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.

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1. An equation of the tangent line to the curve $y = x - \frac{1}{x}$ at the point $(1,0)$ is given by

   a. $y = 1 - x$

   b. $y = 1$

   c. $y = 3x - 3$

   d. $y = \frac{1}{2}x - \frac{1}{2}$

   e. $y = 2x - 2$

2. If $f(x) = \frac{ax+b}{cx+d}$, where a, b, c and d are constants, then $f'(x) =$

   a. $\frac{2acx + (ad+bc)}{(cx+d)^2}$

   b. $\frac{a+b}{cx+d}$

   c. $\frac{ad-bc}{(cx+d)^2}$

   d. $\frac{acx + (ad-bc)}{(cx+d)^2}$

   e. $\frac{(a+c)x - (b+d)}{(cx+d)^2}$

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3. The value of $\frac{1-\tanh(1/2)}{1+\tanh(1/2)}$ is equal to

   a. e

   b. $\sqrt{e}$

   c. e^{-1}

   d. 1

   e. e^{2}

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

   a. $(1+2x)^2(1-x^2)^3(6-8x-22x^2)$

   b. $(-48x)(1+2x)^2(1-x^2)^3$

   c. $(12x)(1+2x)^3(1-x^2)^4$

   d. $(1+2x)^3\cdot 4(1-x^2)^3+(1-x^2)^4\cdot 3(1+2x)^2$

   e. $(1+2x)^2(1-x^2)^3(-6-8x-10x^2)$

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5. If f is a differentiable function and $g(x) = e^{2f(2x)}$, then $g'(x) =$

   a. $2f'(2x)e^{2f(2x)}$

   b. $2e^{2f(2x)}$

   c. $f'(2x)e^{2f(2x)}$

   d. $4f'(2x)e^{2f(2x)}$

   e. $2f'(2x)e^{2f(2x)-1}$

6. The slope of the tangent line to the curve $(2x-3y)^2 = xy^2$ at the point $(1, \frac{1}{2})$ is

   a. $\frac{5}{4}$

   b. $\frac{7}{16}$

   c. $\frac{11}{16}$

   d. $\frac{3}{4}$

   e. $\frac{3}{16}$

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7. If the position of a particle is given by the equation $s(t) = -\frac{1}{3}t^3 + \frac{3}{2}t^2 - 2t + 1,\ 0 \le t \le 5,$ then the particle moves in **the negative direction** during the time interval(s) [t is measured in seconds and s in meters]
   a. (0, 1) and (2, 5)
   b. (1, 2) only
   c. (0, 1) and (1, 2)
   d. (2, 5) only
   e. (1, 2) and (2, 5)

8. The number of points on the curve $y = \frac{1}{x^4 + x^2 + 1}$ at which the tangent line is horizontal is
   a. Zero
   b. Two
   c. Three
   d. Four
   e. One

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9. If the polynomial $P(x) = ax^3 + bx^2 + cx + d$ satisfies the conditions $P(1) = 1, P'(1) = 3,\ P''(1) = 6$ and $P'''(1) = 12,$ then $abcd =$

   a. -18

   b. 12

   c. 18

   d. 36

   e. -9

10. If $x = \ln(\cosh t) - \frac{1}{2}\tanh^2 t,$ then $\frac{dx}{dt} =$

   a. $\sec h^3 t$

   b. $\tanh t - \sec h^2 t$

   c. $\tanh t$

   d. $\tanh^2 t$

   e. $\tanh^3 t$

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11.If $\sqrt{x}+\sqrt{y}=2,$ then $y''=$

a. $\dfrac{1}{y\sqrt{x}}$

b. $\dfrac{1}{2y\sqrt{x}}$

c. $\dfrac{\sqrt{y}}{2x}$

d. $\dfrac{1}{x\sqrt{x}}$

e. $\dfrac{\sqrt{x}-\sqrt{y}}{x}$

12.If $y=x\sinh^{-1}\left(\dfrac{x}{3}\right)-\sqrt{9+x^2}$, then $y'=$

a. $\sinh^{-1}\left(\dfrac{x}{3}\right)$

b. $\dfrac{2x}{\sqrt{9+x^2}}+\sinh^{-1}\left(\dfrac{x}{3}\right)$

c. $\sinh^{-1}\left(\dfrac{x}{3}\right)-\dfrac{x}{\sqrt{9+x^2}}$

d. 0

e. $\dfrac{1}{3}-\dfrac{2x}{\sqrt{9+x^2}}$

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13. The volume of a sphere is increasing at a rate of $6\ \text{cm}^3/\text{sec}$. The rate of change of its surface area when its volume is $\frac{256\pi}{3}\ \text{cm}^3$ is [Hint: $V = \frac{4\pi}{3}r^3$ and $S = 4\pi r^2$]

a. 3

b. $\frac{3}{8}$

c. 2

d. $\frac{64}{3}$

e. $\frac{3}{4}$

14. If $f(t) = \frac{\tan t}{1+\sec t}$, then $f'(t) =$

a. $\frac{\sec^2 t}{1+\sec t}$

b. $\frac{\sec t}{(1+\sec t)^2}$

c. $\frac{\sec t}{1+\sec t}$

d. $\frac{\sec t + \tan t}{(1+\sec t)^2}$

e. $\frac{\sec t \tan^2 t}{(1+\sec t)^2}$

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15. If $y = \ln\sqrt{\frac{1+\sin x}{1-\sin x}}$, then $\frac{dy}{dx} =$

a. $\tan x$

b. $\sec x$

c. $\cot x$

d. $\sin x$

e. $\cos x$

16. If $f(x) = \cos^{-1}(4^{x^2-3} - 4)$, then $f'(2) =$

a. 8

b. $-8\ln 4$

c. $-16\ln 4$

d. $\frac{-8\ln 4}{\sqrt{2}}$

e. $\frac{\ln 4}{\sqrt{2}}$

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17. The value of the limit $\lim_{\theta \to 0} \dfrac{\sin(2\theta)}{\theta + \tan(4\theta)}$ is equal to

a. $\dfrac{1}{2}$

b. $\dfrac{2}{3}$

c. $\dfrac{5}{6}$

d. $\dfrac{2}{5}$

e. $\dfrac{3}{4}$

18. An equation of the tangent line to the curve $y = (x+1)^{\ln(2x-1)}$ when $x = 1$ is given by

a. $y = (\ln 2)x + (1 - \ln 2)$

b. $y = (\ln 3)x - 2$

c. $y = x - 1$

d. $y = 1 - (\ln 2)x$

e. $y = (\ln 4)x + (1 - \ln 4)$

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19. The equation of the line which is tangent to the curve $y = e^x - x$ and passes through the origin is

a. $y = x$

b. $y = (1-e)x$

c. $y = (e-1)x$

d. $y = ex$

e. $y = -ex$

20. If $f(x) = \dfrac{1}{3-4x}$, then $f^{(2008)}(1) =$

a. $(-1)\cdot 4^{2008}\cdot(2008)!$

b. $(2008)!$

c. $4^{2008}\cdot(2008)!$

d. $\dfrac{(-1)\cdot(2008)!}{4^{2008}}$

e. $(-1)\cdot(2009)!$

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Answer Key

Q#	Mater	Code 001	Code 002	Code 003	Code 004
1	a	e	b	a	d
2	a	c	b	a	b
3	a	c	e	c	b
4	a	a	a	c	e
5	a	d	b	c	c
6	a	b	a	d	a
7	a	a	c	b	c
8	a	e	d	e	a
9	a	c	e	a	a
10	a	e	b	b	d
11	a	d	d	c	e
12	a	a	b	b	e
13	a	a	c	b	c
14	a	c	c	e	b
15	a	b	d	a	a
16	a	c	c	c	c
17	a	d	d	d	d
18	a	e	a	b	c
19	a	c	a	e	a
20	a	a	e	a	c