King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics

CODE 001 **Calculus I** **CODE 001**

EXAM II

Semester II, Term 072

Monday, April 28, 2008

Net Time Allowed: 120 minutes

Name: _____

ID: _____ Sec: _____.

Check that this exam has 20 questions.

Important Instructions:

1. All types of calculators, pagers or mobile phones are NOT allowed during the examination.
2. Use HB 2.5 pencils only.
3. Use a good eraser. DO NOT use the erasers attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.
6. The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question 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.

1. The limit $\lim_{x \to 1} \dfrac{x^{100} - 1}{x - 1}$

   (a) does not exist

   (b) equals 99

   (c) equals -100

   (d) equals 0

   (e) equals 100

2. If $f(x) = \dfrac{g(\sqrt{x})}{2g(x) + 1}$, $g(1) = 2$ and $g'(1) = -1$, then $f'(1)$ equals

   (a) $\dfrac{3}{50}$

   (b) $\dfrac{2}{5}$

   (c) $\dfrac{8}{50}$

   (d) $\dfrac{-3}{25}$

   (e) $\dfrac{1}{25}$

3. An equation of the tangent line to the curve $y = \pi x^2 + \cos\left(\frac{\pi}{2}x\right)$ at $x = 1$ is given by

(a) $y = \frac{3\pi}{2}(x-1)$

(b) $y = \frac{\pi}{2}(3x-1)$

(c) $y = -\frac{\pi}{2}(3x-1)$

(d) $y = \pi(3x-1)$

(e) $y = -\frac{3\pi}{2}(x-1)$

4. Which one of the following statements is **TRUE**?

(a) $\frac{d}{dx}(\ln 8) = \frac{1}{8}$

(b) If $f(x) = xe^x$, then $f'(x) = e^x + x^2e^{x-1}$

(c) If f is differentiable, then $\frac{d}{dx}[f(\tan x)] = f'(\tan x)\cdot \sec^2 x$

(d) $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$

(e) $\frac{d}{dx}|x^2+x| = |2x+1|$

5. Let

$$f(x) = \begin{cases} 3 & \text{if} \quad x \leq 0 \\ 3 - x^2 & \text{if} \quad 0 < x < 3 \\ 6 - 4x & \text{if} \quad x \geq 3. \end{cases}$$

Which one of the following statements is **TRUE**?

(a) f is differentiable everywhere except at $x = 0$ and $x = 3$

(b) $f'(-1) = 2$

(c) f is differentiable at $x = 3$

(d) f is differentiable everywhere except at $x = 3$

(e) $f'(5) = -14$

6. The slope of the tangent line to the curve $y = (1 - x^{-1})^{-1}$ at $x = -1$ is

(a) $-\frac{1}{4}$

(b) $-\frac{3}{4}$

(c) 1

(d) $-\frac{1}{2}$

(e) 0

7. An equation of the tangent line to the curve $x^2 + 2xy - y^2 + x = 2$ at the point $(1, 2)$ is given by

(a) $2x - 7y = -12$

(b) $y = -x + 3$

(c) $y = 4x - 2$

(d) $y = 3x - 1$

(e) $7x - 2y = 3$

8. The position of a particle is given by the equation $s = f(t) = 2t^3 - 9t^2 + 12t$ (where t and s are measured in seconds and meters respectively.) The total distance traveled by the particle during the first three seconds is

(a) 20 m

(b) 9 m

(c) 6 m

(d) 11 m

(e) 18 m

9. If $f(x) = \cot^{-1}(e^{2x} - \sqrt{1+x^2})$, then $f'(0)$ is equal to

(a) 0

(b) 1

(c) $\dfrac{3}{2}$

(d) -2

(e) $-\dfrac{1}{2}$

10. The slope of the tangent line to the curve $y = \ln(\ln(\ln x))$ at $x = e^e$ is

(a) e^{1-e}

(b) $1 - e^{-1}$

(c) $\dfrac{e}{1+e}$

(d) e^{-1-e}

(e) e

11. If $y = 5^{\sin^2(x^3)}$, then $\dfrac{y'}{x^2 y} =$

(a) $3\sin(3x^2)$

(b) $\ln(25) \cdot \sin(2x^3)$

(c) $\ln(125) \cdot \sin(3x^2)$

(d) $(\ln 5) \cdot \sin(2x^3)$

(e) $\ln(125) \cdot \sin(2x^3)$

12. The graph of $y = \dfrac{x^2 - 1}{x^2 + 1}$ has a horizontal tangent line at the point

(a) $(0, 0)$

(b) $(0, 1)$

(c) $(-1, 0)$

(d) $(1, 0)$

(e) $(0, -1)$

13. If $x^4 + y^4 = 3$, then $y'' =$

(a) $\dfrac{-9x^2}{y^7}$

(b) $\dfrac{-3x^2}{y^7}$

(c) $\dfrac{3(x^3 - y^3)}{y^6}$

(d) $\dfrac{3x^2(x + y^2)}{y^4}$

(e) $\dfrac{-x^3}{y^3}$

14. If $f(x) = (8x - 6)^x$, then $f'(1)$ is equal to

(a) $\dfrac{1}{6} + 2\ln 2$

(b) $\ln 2$

(c) 1

(d) $4 + \ln 2$

(e) $8 + 2\ln 2$

15. $D^{51}\cos(2x)$ is equal to

(a) $2^{50}\cos(2x)$

(b) $-2^{50}\sin(2x)$

(c) $2^{51}\cos(2x)$

(d) $2^{51}\sin(2x)$

(e) $-2^{51}\sin(2x)$

16. If $(\sin y)^x = x^{\sin y}$, then $y' =$

(a) $\dfrac{\cos y - \ln(\sin y)}{x\cot y - \ln x \cdot \cos y}$

(b) $\dfrac{x\cot y - \ln x}{\sin y - \ln(\sin y)}$

(c) $\dfrac{\sin y - \ln(\sin y)}{x^2\cot y - x\ln x \cdot \cos y}$

(d) $\dfrac{\cos y - x\ln(\sin y)}{x[x\tan y - \ln x \cdot \sin y]}$

(e) $\dfrac{\sin y - x\ln(\sin y)}{x[x\cot y - \ln x \cdot \cos y]}$

17. If the curves $y = ax^2 + b$ and $y = 2x^2 + cx$ have a common tangent line at the point $(-1, 0)$, then $a - b + c$ equals

(a) -4

(b) -3

(c) 2

(d) 4

(e) 3

18. The value of the limit $\lim_{t \to 0} \dfrac{\tan t - \sin t \cos t}{t \sin^2 t}$ is equal to

(a) $+\infty$

(b) -1

(c) $1/2$

(d) 1

(e) 0

19. If $y = \dfrac{1}{x^2+1}$, then $y''' =$

(a) $\dfrac{24x - 24x^3}{(x^2+1)^4}$

(b) $\dfrac{40x^3 - 8x}{(x^2+1)^4}$

(c) $\dfrac{40x^3 - 8x}{(x^2+1)^3}$

(d) $\dfrac{8x^3 + 12x}{(x^2+1)^4}$

(e) $\dfrac{10x^2 - 2}{(x^2+1)^3}$

20. If $f(x) = (x+1)(x+2)^2(x+3)^3(x+4)^2(x+5)$, then $f'(-1)$ is equal to

(a) 120

(b) 0

(c) -36

(d) 72

(e) 288

Q	MM	V1	V2	V3	V4
1	a	e	e	d	a
2	a	a	b	b	b
3	a	b	b	a	b
4	a	c	d	b	d
5	a	d	d	b	b
6	a	a	e	c	d
7	a	e	c	d	e
8	a	d	d	b	c
9	a	d	d	d	a
10	a	d	c	d	b
11	a	e	d	b	c
12	a	e	c	a	e
13	a	a	d	a	d
14	a	e	d	b	b
15	a	d	b	d	b
16	a	e	e	a	d
17	a	d	e	a	b
18	a	d	a	e	a
19	a	a	c	b	c
20	a	e	b	a	e