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

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

EXAM II

Semester I, Term 081

Monday December 29, 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. If $f(x) = (\cosh x)^2$, then $f'(\ln 2) =$

(a) $\dfrac{5}{16}$

(b) $\dfrac{15}{24}$

(c) $\dfrac{15}{4}$

(d) $\dfrac{3}{8}$

(e) $\dfrac{15}{8}$

2. $\dfrac{d}{dt}\left(\dfrac{2t-1}{3t+2}\right)^8 =$

(a) $\dfrac{56(2t-1)^7}{(3t+2)^{18}}$

(b) $\dfrac{72(2t-1)^7}{(3t+2)^9}$

(c) $\dfrac{56(2t-1)^7}{(3t+2)^9}$

(d) $\dfrac{24(2t-1)^7}{(3t+2)^9}$

(e) $\dfrac{48(2t-1)^7}{(3t+2)^{18}}$

3. The slope of the tangent line to the graph of $f(x) = \dfrac{x^2 - 2\sqrt{x}}{2x+3}$ at $x = 1$ is equal to

(a) $\dfrac{3}{25}$

(b) $-\dfrac{7}{25}$

(c) $\dfrac{7}{25}$

(d) $\dfrac{9}{25}$

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

4. If the position of a particle is given by the equation

$$S(t) = 2t^3 - 9t^2 + 12t,$$

where t is measured in seconds and S in meters, then the total distance traveled by the particle during the time interval $[0, 2]$ is

(a) 1 meter

(b) 4 meters

(c) 9 meters

(d) 6 meters

(e) 5 meters

5. $\lim_{x\to 0} \dfrac{3\tan 2x - 5\tan 3x}{7x\cos x + 4\sin 5x} =$

(a) $\dfrac{1}{27}$

(b) $-\dfrac{1}{3}$

(c) $\dfrac{5}{27}$

(d) $-\dfrac{8}{9}$

(e) $-\dfrac{1}{9}$

6. Which one of the following statements is **FALSE** about the function $f(x) = x^{2/3}$?

(a) the domain of f' is $(-\infty, 0) \cup (0, \infty)$

(b) f has no horizontal tangents

(c) f is continuous at $(0, 0)$

(d) $\lim_{x\to 0^-} f'(x) = \lim_{x\to 0^+} f'(x) = +\infty$

(e) f has a vertical tangent at $x = 0$

7. If $f(x) = \cos x$, then $f^{(99)}(x) =$

(a) $\cos x$

(b) $-\cos x$

(c) $\sin x$

(d) $-\sin x$

(e) none of the other given answers

8. If $g(x) = \sec(x^3)\ \cot(x^3)$, then $g'(x) =$

(a) $-3x^2 \csc(x^3)\ \tan(x^3)$

(b) $-3x^2 \sec(x^3)\ \tan(x^3)$

(c) $-3x^2 \sec(x^3)\ \cot(x^3)$

(d) $-3x^2 \csc(x^3)\ \cot(x^3)$

(e) $-3x^2 \sec(x^3)\ \csc^2(x^3)\ \tan(x^3)$

9. If $y = x\cos^{-1}\left(\frac{x}{2}\right) - \sqrt{4-x^2}$, then $\frac{dy}{dx} =$

(a) $\frac{1}{4}\cos^{-1}\left(\frac{x}{2}\right)$

(b) $2\cos^{-1}\left(\frac{x}{2}\right) - \frac{2x}{\sqrt{4-x^2}}$

(c) $\frac{1}{4}\cos^{-1}\left(\frac{x}{2}\right) - \frac{x}{\sqrt{4-x^2}}$

(d) $\cos^{-1}\left(\frac{x}{2}\right) - \frac{2x}{\sqrt{4-x^2}}$

(e) $\cos^{-1}\left(\frac{x}{2}\right)$

10. $\lim_{\theta\to 0} \frac{\cos\theta - 1}{3\tan^2\theta} =$

(a) $-\frac{3}{2}$

(b) $-\frac{1}{6}$

(c) 0

(d) $\frac{2}{3}$

(e) does not exist

11. If $f(x) = 3x \sin 2x$, then $\lim_{h\to 0} \frac{1}{h}\left[f\left(\frac{\pi}{2}+h\right) - f\left(\frac{\pi}{2}\right)\right] =$

(a) -3π

(b) $-3 - 3\pi$

(c) $-\frac{3\pi\sqrt{2}}{2}$

(d) $\frac{\sqrt{2}}{2} + 3\pi$

(e) $3 + 6\pi$

12. If $y = x^{1/x}$, then $\frac{dy}{dx} =$

(a) $x^{-2+\frac{1}{x}}\,(1 - \ln x)$

(b) $-\,x^{-3+\frac{1}{x}}\,\ln x$

(c) $x^{-2+\frac{1}{x^2}}\,(1 - \ln x)$

(d) $-\,x^{-3+\frac{1}{x}}$

(e) $x^{-2+\frac{1}{x^2}}\,(1 + \ln x)$

13. If $4x^2 + y^2 = 4$, then $y'' =$

(a) $-\dfrac{1}{4y^3}$

(b) $\dfrac{16x}{y^4}$

(c) $-\dfrac{16}{y^3}$

(d) $-\dfrac{16x^3}{y^3}$

(e) $\dfrac{4x}{y^4}$

14. The equation of the horizontal tangent to the graph of $y = \sqrt{x}\, e^{-\sqrt{x}}$ is

(a) $y = \dfrac{\sqrt{2}}{e}$

(b) $y = \dfrac{1}{\sqrt{e}}$

(c) $y = \dfrac{1}{e}$

(d) $y = -\dfrac{1}{e}$

(e) $y = -\dfrac{1}{\sqrt{e}}$

15. If $\cosh x = \frac{5}{3}, \quad x < 0, \quad$ then the value of $\quad 9\sinh x - 20\tanh x =$

(a) 4

(b) $-\frac{4}{15}$

(c) -24

(d) -8

(e) 12

16. If $f(x) = \ln\left[\frac{\sin^2 x \ \tan^4 x}{(1+\cos^2 x)^3}\right], \quad$ then $\quad f'\left(\frac{\pi}{4}\right) =$

(a) 8

(b) 16

(c) 12

(d) 14

(e) 10

17. The altitude of a triangle is increasing at a rate of $\frac{1}{2}$ cm/min while the area of the triangle is decreasing at a rate of $\frac{3}{2}$ cm^2/min. **The rate at which the base of the triangle is changing** when the altitude is 8 cm and the area is 80 cm^2 **is equal to**

(a) $\frac{7}{8}$ cm/min

(b) $-\frac{15}{8}$ cm/min

(c) $\frac{11}{8}$ cm/min

(d) $-\frac{13}{8}$ cm/min

(e) $-\frac{11}{8}$ cm/min

18. If m is the slope of the tangent line to the graph of $2^{x+y} = x^2 + xy^2 + 1$ at the point $(-1, 1)$, then the product $(2 + \ln 2)\, m$ is equal to

(a) 1

(b) $2 - \ln 2$

(c) -1

(d) $-1 - \ln 2$

(e) $-2 + \ln 2$

19. If the normal line to the parabola $y = x^2 + x$ at the point $(-1, 0)$ intersects the parabola a second time at the point (α, β), then $\alpha - \beta =$

(a) -1

(b) -3

(c) 1

(d) -2

(e) 2

20. If $f(x) = \begin{cases} 3\,, & \text{if } x \leq 0 \\ 3 - x\,, & \text{if } 0 < x < 2 \\ \dfrac{1}{3-x}\,, & \text{if } x \geq 2 \end{cases}$, then f is **not differentiable** at

(a) $x = 0,$ and 2 only

(b) $x = 2,$ and 3 only

(c) $x = 3$ only

(d) $x = 0,\ 2,$ and 3

(e) $x = 0,$ and 3 only

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