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

Calculus I
EXAM II
Semester I, Term 081
Monday December 29, 2008

EXAM COVER

Number of versions: 4
Number of questions: 20
Number of Answers: 5 per question

This exam was prepared using mcqs
For questions send an email to Dr. Ibrahim Al-Lehyani (iallehyani@kaau.edu.sa)

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Calculus I
EXAM II
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Net Time Allowed: 120 minutes

MASTER VERSION

1. 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) $\dfrac{7}{25}$

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

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

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

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

2. 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) 6 meters

(b) 9 meters

(c) 1 meter

(d) 4 meters

(e) 5 meters

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(a) $\sin x$

(b) $\cos x$

(c) $-\sin x$

(d) $-\cos x$

(e) none of the other given answers

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

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

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

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

(d) f has no horizontal tangents

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

8. 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) $\frac{\sqrt{2}}{2} + 3\pi$

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

(d) $3 + 6\pi$

(e) $-3 - 3\pi$

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

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

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

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

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

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

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

(a) $-\dfrac{1}{6}$

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

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

(d) 0

(e) does not exist

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

(a) 4

(b) -24

(c) -8

(d) 12

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

12. If $4x^2 + y^2 = 4, \quad$ then $\quad y'' =$

(a) $-\frac{16}{y^3}$

(b) $\frac{4x}{y^4}$

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

(d) $\frac{16x}{y^4}$

(e) $-\frac{1}{4y^3}$

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

(a) 12

(b) 14

(c) 8

(d) 10

(e) 16

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

17. 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) $x = 0,\ 2,$ and 3

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

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

(d) $x = 3$ only

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

18. 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) 2

(c) -2

(d) 1

(e) -3

19. 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) $-1 - \ln 2$

(b) -1

(c) $-2 + \ln 2$

(d) 1

(e) $2 - \ln 2$

20. 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) $-\frac{13}{8}$ cm/min

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

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

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

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

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

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

EXAM II

Semester I, Term 081

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Net Time Allowed: 120 minutes

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ID: _____ Sec: _____.

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4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
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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 $x = 0$

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(b) $-\cos x$

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

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

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

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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

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(c) $x = 3$ only

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

Name .....

ID ..... Sec .....

1	a	b	c	d	e	f
2	a	b	c	d	e	f
3	a	b	c	d	e	f
4	a	b	c	d	e	f
5	a	b	c	d	e	f
6	a	b	c	d	e	f
7	a	b	c	d	e	f
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59	a	b	c	d	e	f
60	a	b	c	d	e	f
61	a	b	c	d	e	f
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63	a	b	c	d	e	f
64	a	b	c	d	e	f
65	a	b	c	d	e	f
66	a	b	c	d	e	f
67	a	b	c	d	e	f
68	a	b	c	d	e	f
69	a	b	c	d	e	f
70	a	b	c	d	e	f

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

CODE 002 **Calculus I** **CODE 002**

EXAM II

Semester I, Term 081

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

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

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

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

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

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

2. 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) $\dfrac{7}{25}$

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

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

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

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

(a) $\frac{15}{8}$

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

(c) $\frac{5}{16}$

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

(e) $\frac{15}{24}$

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) 6 meters

(b) 9 meters

(c) 1 meter

(d) 4 meters

(e) 5 meters

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

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

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

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

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

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7. 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) $-3 - 3\pi$

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

(c) -3π

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

(e) $3 + 6\pi$

8. 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 is continuous at $(0, 0)$

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

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

(e) f has no horizontal tangents

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

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

(b) 0

(c) $-\dfrac{1}{6}$

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

(e) does not exist

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

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

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

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

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

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

(a) 8

(b) 10

(c) 12

(d) 16

(e) 14

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

(a) $\cos x$

(b) $-\sin x$

(c) none of the other given answers

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

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

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

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

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

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

(a) 12

(b) 4

(c) -8

(d) $-\dfrac{4}{15}$

(e) -24

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

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

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

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

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

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

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

(a) $y = -\frac{1}{e}$

(b) $y = \frac{\sqrt{2}}{e}$

(c) $y = \frac{1}{\sqrt{e}}$

(d) $y = \frac{1}{e}$

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

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

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

(b) $x = 3$ only

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

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

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

18. 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) $-\frac{13}{8}$ cm/min

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

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

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

19. 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) $2 - \ln 2$

(d) $-1 - \ln 2$

(e) 1

20. 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) -2

(b) -3

(c) -1

(d) 1

(e) 2

Name .....

ID ..... Sec .....

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63	a	b	c	d	e	f
64	a	b	c	d	e	f
65	a	b	c	d	e	f
66	a	b	c	d	e	f
67	a	b	c	d	e	f
68	a	b	c	d	e	f
69	a	b	c	d	e	f
70	a	b	c	d	e	f

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

CODE 003 **Calculus I** **CODE 003**

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) $\frac{5}{16}$

(b) $\frac{3}{8}$

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

(d) $\frac{15}{24}$

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

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

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

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

(c) $-\frac{3}{25}$

(d) $\frac{7}{25}$

(e) $\frac{9}{25}$

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

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

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

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

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

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

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) 5 meters

(b) 6 meters

(c) 4 meters

(d) 9 meters

(e) 1 meter

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

(a) does not exist

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

(c) 0

(d) $-\dfrac{3}{2}$

(e) $-\dfrac{1}{6}$

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

(a) 10

(b) 14

(c) 12

(d) 8

(e) 16

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

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

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

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

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

(e) f has no horizontal tangents

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(b) 12

(c) -24

(d) 4

(e) -8

12. If $4x^2 + y^2 = 4, \quad$ then $\quad y'' =$

(a) $-\frac{16}{y^3}$

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

(c) $-\frac{1}{4y^3}$

(d) $\frac{4x}{y^4}$

(e) $-\frac{16x^3}{y^3}$

13. 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) $-3 - 3\pi$

(b) -3π

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

(d) $3 + 6\pi$

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

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

(a) $-\cos x$

(b) $\sin x$

(c) $\cos x$

(d) $-\sin x$

(e) none of the other given answers

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

18. 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) -3

(b) -1

(c) 1

(d) -2

(e) 2

19. 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) $2 - \ln 2$

(b) -1

(c) $-2 + \ln 2$

(d) 1

(e) $-1 - \ln 2$

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

(a) $x = 3$ only

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

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

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

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

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ID ..... Sec .....

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65	a	b	c	d	e	f
66	a	b	c	d	e	f
67	a	b	c	d	e	f
68	a	b	c	d	e	f
69	a	b	c	d	e	f
70	a	b	c	d	e	f

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

CODE 004 **Calculus I** **CODE 004**

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.
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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) $\frac{15}{8}$

(b) $\frac{5}{16}$

(c) $\frac{3}{8}$

(d) $\frac{15}{24}$

(e) $\frac{15}{4}$

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

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

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

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

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

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

3. 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) 4 meters

(b) 9 meters

(c) 1 meter

(d) 5 meters

(e) 6 meters

4. 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) $\dfrac{7}{25}$

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

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

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

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

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

(a) -8

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

(c) 12

(d) -24

(e) 4

6. 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) $-\frac{3\pi\sqrt{2}}{2}$

(b) $-3-3\pi$

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

(d) -3π

(e) $3+6\pi$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(d) f has no horizontal tangents

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

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

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

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

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

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

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

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

(a) 16

(b) 8

(c) 14

(d) 12

(e) 10

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

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

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

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

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

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

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

(a) $\sin x$

(b) $\cos x$

(c) $-\cos x$

(d) $-\sin x$

(e) none of the other given answers

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

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

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

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

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

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

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

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

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

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

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

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

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

(a) does not exist

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

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

(d) $-\dfrac{3}{2}$

(e) 0

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

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

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

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

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

18. 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) $x = 0,$ and 3 only

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

(d) $x = 3$ only

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

19. 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) $-2 + \ln 2$

(b) -1

(c) $2 - \ln 2$

(d) $-1 - \ln 2$

(e) 1

20. 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) 2

(c) -2

(d) -3

(e) -1

Name .....

ID ..... Sec .....

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2	a	b	c	d	e	f
3	a	b	c	d	e	f
4	a	b	c	d	e	f
5	a	b	c	d	e	f
6	a	b	c	d	e	f
7	a	b	c	d	e	f
8	a	b	c	d	e	f
9	a	b	c	d	e	f
10	a	b	c	d	e	f
11	a	b	c	d	e	f
12	a	b	c	d	e	f
13	a	b	c	d	e	f
14	a	b	c	d	e	f
15	a	b	c	d	e	f
16	a	b	c	d	e	f
17	a	b	c	d	e	f
18	a	b	c	d	e	f
19	a	b	c	d	e	f
20	a	b	c	d	e	f
21	a	b	c	d	e	f
22	a	b	c	d	e	f
23	a	b	c	d	e	f
24	a	b	c	d	e	f
25	a	b	c	d	e	f
26	a	b	c	d	e	f
27	a	b	c	d	e	f
28	a	b	c	d	e	f
29	a	b	c	d	e	f
30	a	b	c	d	e	f
31	a	b	c	d	e	f
32	a	b	c	d	e	f
33	a	b	c	d	e	f
34	a	b	c	d	e	f
35	a	b	c	d	e	f

36	a	b	c	d	e	f
37	a	b	c	d	e	f
38	a	b	c	d	e	f
39	a	b	c	d	e	f
40	a	b	c	d	e	f
41	a	b	c	d	e	f
42	a	b	c	d	e	f
43	a	b	c	d	e	f
44	a	b	c	d	e	f
45	a	b	c	d	e	f
46	a	b	c	d	e	f
47	a	b	c	d	e	f
48	a	b	c	d	e	f
49	a	b	c	d	e	f
50	a	b	c	d	e	f
51	a	b	c	d	e	f
52	a	b	c	d	e	f
53	a	b	c	d	e	f
54	a	b	c	d	e	f
55	a	b	c	d	e	f
56	a	b	c	d	e	f
57	a	b	c	d	e	f
58	a	b	c	d	e	f
59	a	b	c	d	e	f
60	a	b	c	d	e	f
61	a	b	c	d	e	f
62	a	b	c	d	e	f
63	a	b	c	d	e	f
64	a	b	c	d	e	f
65	a	b	c	d	e	f
66	a	b	c	d	e	f
67	a	b	c	d	e	f
68	a	b	c	d	e	f
69	a	b	c	d	e	f
70	a	b	c	d	e	f

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

Answer Counts

V	a	b	c	d	e
1	2	2	3	6	7
2	5	6	2	5	2
3	6	6	3	4	1
4	4	9	3	0	4

VQ	MQ	Answers				
1	4	b	c	d	e	a
2	3	c	d	a	e	b
3	1	e	d	a	c	b
4	2	c	d	b	a	e
5	5	b	a	d	e	c
6	7	e	d	b	a	c
7	6	b	d	a	c	e
8	15	c	b	d	a	e
9	16	d	e	c	b	a
10	10	c	a	d	b	e
11	8	a	e	c	b	d
12	14	a	c	d	e	b
13	12	e	d	a	c	b
14	9	e	b	a	c	d
15	11	a	e	b	c	d
16	13	c	e	a	b	d
17	20	d	e	b	a	c
18	19	d	e	b	a	c
19	18	a	e	d	c	b
20	17	e	c	d	a	b

VQ	MQ	Answers				
1	3	c	a	e	b	d
2	1	a	d	b	c	e
3	4	a	d	b	e	c
4	2	a	b	c	d	e
5	5	a	b	c	e	d
6	12	e	a	c	d	b
7	8	e	b	a	c	d
8	7	e	b	a	c	d
9	10	c	d	a	b	e
10	15	b	a	c	e	d
11	13	c	d	a	e	b
12	6	b	c	e	d	a
13	14	e	b	c	a	d
14	11	d	a	c	e	b
15	16	c	b	d	a	e
16	9	c	e	b	a	d
17	17	b	d	a	e	c
18	20	d	a	b	c	e
19	19	b	c	e	a	d
20	18	c	e	a	d	b

VQ	MQ	Answers				
1	4	b	e	d	c	a
2	1	e	d	b	a	c
3	3	a	b	c	d	e
4	2	e	a	d	b	c
5	10	e	b	d	c	a
6	13	d	b	a	c	e
7	7	a	b	c	e	d
8	16	e	a	b	c	d
9	14	c	d	e	a	b
10	15	e	c	b	d	a
11	11	e	d	b	a	c
12	12	a	d	e	b	c
13	8	e	a	b	d	c
14	6	d	a	b	c	e
15	9	a	b	e	d	c
16	5	b	c	a	e	d
17	20	c	a	b	e	d
18	18	e	a	d	c	b
19	19	e	b	c	d	a
20	17	d	c	a	b	e

VQ	MQ	Answers				
1	4	a	b	e	c	d
2	3	a	e	b	c	d
3	2	d	b	c	e	a
4	1	a	b	d	e	c
5	11	c	e	d	b	a
6	8	c	e	b	a	d
7	15	e	b	a	d	c
8	16	c	a	d	b	e
9	7	b	a	c	d	e
10	12	e	c	b	d	a
11	13	e	c	b	a	d
12	14	a	b	d	e	c
13	6	a	b	d	c	e
14	9	b	a	c	e	d
15	5	c	e	d	b	a
16	10	e	a	b	c	d
17	20	e	c	d	b	a
18	17	e	b	c	d	a
19	19	c	b	e	a	d
20	18	d	b	c	e	a