CODE I

King Fahd University of Petroleum & Minerals
Department of Mathematical Sciences

First Semester 2008/2009 (081)
Math 132 – Final Examination

Date: February 8, 2009 Time: 7:30-10:00 AM

THE USE OF CALCULATORS IS NOT ALLOWED IN THIS EXAM

Name: _____ I.D. # _____ Sec. # _____ Sr. # _____

ANSWER SHEET FOR CODE I

1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
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14	a	b	c	d	e
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16	a	b	c	d	e
17	a	b	c	d	e
18	a	b	c	d	e
19	a	b	c	d	e
20	a	b	c	d	e
21	a	b	c	d	e
22	a	b	c	d	e
23	a	b	c	d	e
24	a	b	c	d	e

DO NOT REMOVE THIS SHEET

1. $\int_0^{\frac{\pi}{4}} \frac{3\sqrt{\tan x}}{1-\sin^2 x}\,dx =$

   a) 0

   b) 1

   c) $\frac{3}{2}$

   d) 2

   e) $\frac{5}{2}$

2. If $f''(x) = 6x + 2$ and $f'(-1) = 5$, then $f(1) - f(-1) =$

   a) 4

   b) 6

   c) 8

   d) 10

   e) 12

3. A manufacturer's marginal revenue is $\frac{dr}{dq} = 200 + 70q - 3q^2$, where r is the revenue function (in Saudi Riyals). What is the unit selling price when 10 units are sold?

   a) SR 27000

   b) SR 4500

   c) SR 450

   d) SR 10

   e) SR 1

4. The area bounded by the x-axis and the graph of $y = 4 - x^2$ from $x = 0$ to $x = 3$ is equal to

   a) 0

   b) $\frac{7}{3}$

   c) 3

   d) $\frac{16}{3}$

   e) $\frac{23}{3}$

5. If $e^{xy} + y^3 = x$, then y' at $(1,0)$ is equal to

   a) 1

   b) -1

   c) e

   d) $-e$

   e) 0

6. The maximum value of $f(x) = -x^2 + 4\ln x$ occurs when $x =$

   a) $\frac{1}{e}$

   b) $\frac{1}{2}$

   c) $\frac{1}{\sqrt{2}}$

   d) $\sqrt{2}$

   e) 2

7. Consider the function $f(x)=\sqrt{x}$. Using differentials, the approximate value of $f(x)$ near $x_o=1$, is

   a) $\frac{x+1}{2}$

   b) $\frac{x}{2}$

   c) $\sqrt{x}$

   d) $\frac{1}{2\sqrt{x}}$

   e) $x-\frac{1}{2}$

8. A real-estate company owns 60 apartments. At SR120 per month, each apartment can be rented. However, for each SR10-per-month increase, there will be 3 vacancies with no possibility of filling them. What rent per apartment will maximize monthly revenue?

   a) SR130

   b) SR140

   c) SR150

   d) SR160

   e) SR170

9. If $f(x,y)=\dfrac{\ln(x^2+5)}{y}$, then $f_{xy}(1,1)=$

   a) 1

   b) $-\dfrac{1}{e}$

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

   d) $-\dfrac{1}{3}$

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

10. An open-top cardboard box is to have a volume of 4 cubic feet. The smallest amount of cardboard (in square feet) that has to be used is

    a) 5

    b) 8

    c) 10

    d) 12

    e) 18

11. The curve $y = \dfrac{2 - x - x^2}{1 - x^2}$ has

a) two vertical asymptotes and one horizontal asymptote.

b) two vertical asymptotes and two horizontal asymptotes.

c) one vertical asymptote and one horizontal asymptote.

d) one vertical asymptote and two horizontal asymptotes.

e) no horizontal asymptotes.

12. If $\int \dfrac{du}{\left(a^2 - u^2\right)^{\frac{3}{2}}} = \dfrac{u}{a^2\sqrt{a^2 - u^2}} + c$, then $\int_0^1 \dfrac{dx}{\left(4 - 3x^2\right)^{\frac{3}{2}}} =$

a) $\dfrac{1}{4}$

b) $\sqrt{3}$

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

d) 2

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

13. If $f(x) = x^3 + 2x^2 - 4x + 10$, then $f(x)$ is

a) increasing on $(-2, \infty)$, and concave down on $\left(-\infty, \frac{2}{3}\right)$.

b) decreasing on $\left(-2, \frac{2}{3}\right)$, and concave up on $\left(-\frac{2}{3}, \infty\right)$.

c) decreasing on $\left(-2, -\frac{2}{3}\right)$, and concave down on $\left(\frac{2}{3}, \infty\right)$.

d) increasing on $\left(\frac{2}{3}, \infty\right)$, and concave down on $\left(-\infty, \frac{2}{3}\right)$.

e) increasing on $\left(-2, \frac{2}{3}\right)$, and concave up on $(-\infty, \infty)$.

14. The largest possible area of a rectangle with base on the x-axis and upper vertices on the curve $y = 3 - x^2$ is

a) 2

b) $\frac{5}{2}$

c) 3

d) $\frac{7}{2}$

e) 4

15. Let $f(x) = Ax^3 + 3x^2 + 2x + 1$. If the function has a point of inflection at $x = -1$, then $A =$

a) 0

b) -1

c) 1

d) -2

e) 2

16. If $y = u^5 - 8u^2 + 2u - 1$ and $u = \sqrt{x + 10}$, then $\frac{dy}{dx}$ when $x = -9$ is equal to

a) 0

b) -1

c) 1

d) -9

e) $-\frac{9}{2}$

17. $\lim_{x \to 2^+} 2^{\frac{x^2}{4-x^2}} =$

a) 0

b) $\frac{1}{2}$

c) 1

d) ∞

e) $-\infty$

18. If $f(x) = \frac{\cos 2x}{1-\sin 2x}$, then $f'(x) =$

a) $\frac{1}{1-\sin 2x}$

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

c) $\frac{2}{1-\sin 2x}$

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

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

19. If $f(x)=\begin{cases}\dfrac{x^2+x-6}{x-2} & if\ x>2\\ \beta x-9 & if\ x\le 2\end{cases}$ is continuous, then the value of β is

a) 0

b) 1

c) 3

d) 5

e) 7

20. $\int_0^1 x^3 e^{x^2}\,dx =$

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

b) $\frac{1}{2}$

c) $\frac{3}{4}$

d) 1

e) e

21. An equation of the plane that is parallel to the y-z plane and passes through $(4,6,9)$ is

a) $x = 4$

b) $y = 6$

c) $z = 9$

d) $x = 6$

e) $z = 4$

22. If α and β are the absolute maximum and minimum of the function $f(x) = x^3 + 3x^2 - 9x + 27$ on the interval $[0,2]$, then $\alpha + \beta =$

a) 2

b) 7

c) 49

d) 51

e) 56

23. The equation of the tangent line to $y = x^2 - 2x + 1$ at $x = -1$ is

a) $y = -4$

b) $y = x + 1$

c) $y = -4x + 4$

d) $y = 0$

e) $y = -4x$

24. Given $y = x \ln x$, then $\frac{d^5 y}{dx^5}\Big|_{x=1} =$

a) -6

b) -2

c) 1

d) 12

e) 24