KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 132 -FINAL EXAM

Tuesday - January 24, 2006

Test Code: 1

Dr. Mohammad Z. Abu-Sbeih TIME: 7:30 - 10:30 A.M.

Serial Number: ________________

Student Number: _______________

Name: _____________________________________

Section Number:	1	At 8:00 AM	4	At 10:00 AM	5	At 11:00 AM

DO NOT USE CALCULATORS OF ANY TYPE

Important Notes

1. Write your serial number, student number, section number and name on both the answer sheet and question paper. **ONLY THE ANSWER SHEET WILL BE GRADED.**

2. Make sure that the test code typed on your answer sheet is the same as that printed on your question paper.

3. Circle only one answer for each question.

4. Check that the exam paper has 25 different questions and extra one bonus.

(1) $\lim_{x \to 2} \frac{7x - 14}{x^2 + 3x - 10}$ is equal to:

(a) 7.
(b) $\frac{7}{3}$.
(c) -1.
(d) 1.
(e) Does not exist.

(2) If $2x^2 + y^2 = 3$, then the values of $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$, respectively, at the point (1, -1) are:

(a) 2 and 6.
(b) 2 and -6.
(c) -2 and 6.
(d) -2 and -6.
(e) 2 and 12.

(3) If $f(x) = x\sqrt{2x^3 + 1}$ then $f'(1)$ is equal to:

(a) 2.
(b) $2\sqrt{3}$.
(c) 0.
(d) $-2\sqrt{3}$.
(e) $\sqrt{3}$.

(4) If $f(x) = x + \frac{1}{x}$, which of the following is **false**:

(a) The graph has one local maximum and one local minimum values.
(b) The graph is increasing on $(-\infty, -1)$ and on $(1, \infty)$.
(c) The graph is concave down on $(-\infty, 0)$ and is concave up on $(0, \infty)$.
(d) The graph has one vertical asymptote and one horizontal asymptote.
(e) The graph has no inflection point.

(5) The graph of the function $f(x) = \frac{x+2}{x^2-3}$ has

(a) a local maximum at $x = 1$ and a local minimum $x = -3$.
(b) a local maximum at $x = -1$ and a local minimum $x = -3$.
(c) a local maximum at $x = -1$ and a local minimum $x = 3$.
(d) a local maximum at $x = 1$ and a local minimum $x = 3$.
(e) no local extrema.

(6) The value of the constant A which will make the function

$$f(x) = \begin{cases} \frac{x+1}{A} & \text{if } x \le 1 \\ 2 - x & \text{if } x > 1 \end{cases}$$

continuous at $x = 1$ is:

(a) 4.
(b) -1.
(c) 2.
(d) 1.
(e) -2.

(7) The **average revenue** in dollars of a certain product is given by $\overline{R}(q) = 50 + q - \dfrac{1230}{q}$. The marginal revenue when 50 units are sold is:

(a) $ 0.6.
(b) $ 120.
(c) $ 50.
(d) $ 100.
(e) $150.

(8) A company currently sells 100 watches monthly at a price of $ 40 each. For each additional dollar the company charges, the public will buy 2 fewer watches monthly. What price should the company charge for each watch to **maximize the monthly revenue**?
(a) $ 45.
(b) $ 41.
(c) $ 44.
(d) $ 42.
(e) $ 50.

(9) The area bounded by the graphs of $f(x) = e^x$ *and* $g(x) = x$,from x = 0 to x = 1, is equal to:

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

(b) $e - \dfrac{3}{2}$.

(c) $e - 2$.

(d) $\dfrac{1}{2}$.

(e) $\dfrac{3}{2}$.

(10) If $y = \log\sqrt{x^3 + 2x - 1}$, then $y'(1)$ is equal to

(a) $\frac{5}{\ln 10}$.

(b) $\frac{1}{4\ln 10}$.

(c) $\frac{1}{4}$.

(d) $\frac{5}{4\ln 10}$.

(e) $\frac{5}{4}$.

(11) The weekly profit, $P(x, y)$, from selling x tables and y beds is given by $P(x, y) = 1000 + 3x^2 - 2xy + y^2 - 8y$. The company will make:

(a) maximum profit when $x = 2$, and $y = 6$.

(b) minimum profit when $x = 3$, and $y = 3$.

(c) minimum profit when $x = 2$, and $y = 6$.

(d) minimum profit when $x = 4$, and $y = 6$.

(e) maximum profit when $x = 6$, and $y = 4$.

(12) If $f(x, y) = x^2 + y^2 - \sin(xy)$ then $xf_x - yf_y$ is equal to

(a) $4xy$.

(b) $2(x^2 + y^2) + 2\cos(xy)$

(c) $2(x^2 + y^2) - 2\cos(xy)$

(d) $2(x^2 + y^2)$

(e) $2(x^2 - y^2)$.

(13) If the demand equation for a certain product is $p = \frac{10q + 5}{q}$, then the rate of change of price *p* with respect to quantity *q* when $q = 10$ is:

(a) 0.5.
(b) 0.005.
(c) -0.5.
(d) -0.05.
(e) 0.05.

(14) If $z = 9\ln[x(x + y)]$, then $z_{xy}(1,2)$ is equal to:

(a) -1.
(b) 1.
(c) 3.
(d) -3
(e) 9.

(15) The domain of the function $f(x, y) = \frac{x + \sin y}{y - x^2}$ is

(a) the set of all real numbers.
(b) $\{(x, y) : y \neq x^2\}$.
(c) the set of all real numbers except zero.
(d) $\{(x, y) : y = x^2\}$.
(e) $y \neq x^2$.

(16) $\int_0^1 \frac{x\ dx}{x-2}$ is equal to

(a) -4.
(b) $\ln 4$.
(c) $\ln 2$.
(d) $1+2\ln 2$.
(e) $1-2\ln 2$.

(17) If $\int \frac{du}{\sqrt{u^2 \pm a^2}} = \ln\left|u+\sqrt{u^2 \pm a^2}\right| + C$, then $\int \frac{dx}{\sqrt{x^2+2x}}$ is equal to:

(a) $\ln\left|\sqrt{x^2+2x}\right|+C$
(b) $\ln\left|x-1-\sqrt{x^2+2x}\right|+C$
(c) $\ln\left|x-1+\sqrt{x^2+2x}\right|+C$
(d) $\ln\left|x+1+\sqrt{x^2+2x}\right|+C$
(e) $\ln\left|x+1-\sqrt{x^2+2x}\right|+C$

(18) $\int_1^e 2x\ \ln x\ dx$ is equal to

(a) $\frac{e^2+1}{2}$
(b) $\frac{e-1}{2}$.
(c) $\frac{e^2-1}{2}$
(d) $\frac{e+1}{2}$.
(e) e^2+1.

(19) $\int \tan^2 x \; dx$ is equal to

(a) $\tan x + x + C$.
(b) $\sec x - x + C$.
(c) $\tan x - x + C$.
(d) $\sec x + x + C$.
(e) $\sec x + C$.

(20) The area between the graphs of $f(x) = x^2 - 1$ and $g(x) = 7 - x^2$ is

(a) $\frac{32}{3}$
(b) $\frac{16}{3}$.
(c) 16.
(d) 32.
(e) $\frac{64}{3}$.

(21) $\int x^{-2}(3x^4 + x^2 - 4x^{-3})\, dx$ is equal to:

(a) $x^3 + x + \frac{2}{3}x^{-6} + C$
(b) $x^3 + x - x^{-4} + C$
(c) $x^3 + x + x^{-4} + C$
(d) $3x + x^{-4} + C$
(e) $3x - x^{-4} + C$

(22) $\int \frac{(x+1)}{\sqrt{x^2+2x+5}}\,dx$ is equal to:

(a) $\sqrt{x^2+2x+5}+C$.

(b) $\frac{1}{2}\sqrt{x^2+2x+5}+C$.

(c) $2\sqrt{x^2+2x+5}+C$.

(d) $4\sqrt{x^2+2x+5}+C$.

(e) $\ln\sqrt{x^2+2x+5}+C$.

(23) The equation of the plane which is parallel to the z –axis and crosses the x-axis and the y-axis at the points (1,0,0) and (0,1,0) respectively is:

(a) $x-y=1$.

(b) $x+y=1$.

(c) $x+y+z=1$.

(d) $x+y-z=1$.

(e) $z=x+y$.

(24) Using differentials to approximate $\sqrt{24}$ we get:

(a) 5.1

(b) 4.899

(c) 4.89

(d) 4.8

(e) 4.9

(25) The function $f(x,y)=x^2+y-2xy+3$ has

(a) a local maximum at $(\frac{1}{2},\frac{1}{2})$.

(b) a local minimum at $(\frac{1}{2},\frac{1}{2})$.

(c) a saddle point at $(\frac{1}{2},\frac{1}{2})$.

(d) two critical points.

(e) no critical points.

(26) **Bonus Problem:** Let $f(x)=k^x-x^k$, where k is a positive constant. Then $f'(1)=0$ when

(a) $k=1$ only.

(b) $k=e$ only.

(c) $k=1$ and $k=e$.

(d) $k=\ln 1$

(e) $k=1$ and $k=0$.