KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 132 -FINAL EXAM

Sunday - June 4, 2006

Test Code: 1

Dr. Mohammad Z. Abu-Sbeih TIME: 7:00 - 10:00 P.M.

Serial Number: _____

Student Number: _____

Name: _____

Section Number:	1	At 8:00 AM	3	At 9:00 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 30 different questions.

(1) $\lim_{x \to 1^-} \left(\frac{x^2 - 1}{x^2 + x - 2} \right)$ is equal to:

(a) 0.
(b) $\frac{2}{3}$.
(c) 1.
(d) -1.
(e) ∞.

(2) $\lim_{x \to \infty} \left(5 - \frac{2x^2 - x + 3}{1 - x^2} \right)$ is equal to:

(a) 7.
(b) 6.
(c) 5.
(d) 3.
(e) ∞.

(3) The value of the constants ***a*** and ***b*** which will make the function

$$f(x) = \begin{cases} x^2 - a & if \quad x < 1 \\ 3 & if \quad x = 1 \\ b - x & if \quad x > 1 \end{cases}$$

continuous at $x = 1$ is:

(a) $a = -2$ and $b = 3$.
(b) $a = 3$ and $b = 4$.
(c) $a = 1$ and $b = 4$.
(d) $a = -2$ and $b = 4$.
(e) $a = 2$ and $b = 4$.

(4) The graph of the function $y = \frac{x}{(1+x)^2}$ has a horizontal tangent when

(a) $x = 0$.
(b) $x = -1$.
(c) $x = 1$.
(d) $x = 2$.
(e) $x = 3$.

(5) The slope of the tangent line to the curve $\cos xy = x + y^2$ at the point (0, 1) is equal to

(a) $\frac{1}{2}$.
(b) 1.
(c) 0.
(d) 5.
(e) $-\frac{1}{2}$.

(6) The demand equation of selling x units at a price p dollars is $p = 200 - \frac{1}{2}x$. The cost in dollars of producing x units is $C(x) = 300 + \frac{1}{4}x^2$. The **estimated profit** from selling the 26^{th} unit is:

(a) \$ 161
(b) \$ 162.5.
(c) \$ 150.
(d) \$ 175.
(e) \$ 174.

(7) If $y = 1 + \cot^2 x^2$ then y' is:

(a) $-4x \csc^2 x^2 \cot x^2$.
(b) $-4x \csc x^2 \cot^2 x^2$.
(c) $-4x \csc^3 x^2$.
(d) $4x \cot^3 x^2$.
(e) $4x \csc^2 x^2 \cot x^2$.

(8) Which of the following is **true** about the graph of the function $f(x) = 3x - x^3$.

(a) The graph is decreasing on $(-\infty, -1)$ and on $(1, \infty)$.
(b) The graph is increasing on $(-1, \infty)$.
(c) The graph has local maximum at x = -1.
(d) The graph has local minimum at x = 1.
(e) The graph has no local extrema.

(9) Given that $f(x) = (x-1)^{-2}$. Which of the following is **false** about the graph of the function $f(x)$.

(a) The graph has no local extrema.
(b) The graph has one vertical asymptote and one horizontal asymptote.
(c) The graph has one inflection point.
(d) The graph is concave up on $(-\infty, 1)$ and on $(1, \infty)$.
(e) The graph has no x - intercepts.

(10) The **average cost** in dollars of a certain product is given by $\overline{C}(q) = 50 + 2q + \frac{2500}{q}$. The marginal cost when 50 units are produced is:

(a) \$ 200
(b) \$ 1.
(c) \$ 150.
(d) \$ 250.
(e) \$100.

(11) The area enclosed by the graphs of $f(x) = x^2$ and $g(x) = x + 2$ is

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

(b) 3.

(c) 4.

(d) $\frac{5}{2}$.

(e) $\frac{9}{2}$.

(12) A company currently sells 100 computer games monthly at a price of \$ 40 each. For each additional dollar the company charges, the public will buy 2 fewer games monthly. What price should the company charge for each game to maximum the monthly revenue?

(a) \$ 50.

(b) \$ 41.

(c) \$ 44.

(d) \$ 42.

(e) \$ 45.

(13) The area bounded by the graphs of $f(x) = \sqrt[3]{x}$ *and* $g(x) = x$ is equal to:

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

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

(c) 1.

(d) 2.

(e) 0.

(14) If $y = \ln\sqrt{\frac{x+1}{x^2+3}}$, then $y'(0)$ is equal to

(a) -0.5.

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

(c) 0.5

(d) $-\frac{1}{4}$.

(e) 4.

(15) If $y = (1+x)^x$ then y' is equal to:

(a) $(1+x)^x\left[\frac{x}{1+x} + \ln(1+x)\right]$.

(b) $x(1+x)^{x-1}$.

(c) $(1+x)^x \ln x$.

(d) $(1+x)^x \ln(x+1)$.

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

(16) If $g(x,y)=\sin(x+y)$ then $g_{xx}g_{yy}+(g_{xy})^2$ is equal to:

(a) 1.
(b) $2\sin^2(x+y)$.
(c) $2\cos^2(x+y)$.
(d) $\sin 2(x+y)$.
(e) 0.

(17) Which of the following statements is **true** about the function $f(x,y)=\dfrac{x+5}{\sqrt{4-x^2-y^2}}$ **?**

(a) The domain is the set of all points inside the circle of radius 2 and center (0,0).
(b) The domain is the set of all points outside the circle of radius 2 and center (0,0).
(c) The domain is the set of all real numbers except +2 and -2.
(d) The graph is a sphere with radius 2 and center (0,0,0).
(e) The plane $z=1$ intersects the graph of the function at a circle of radius 2.

(18) $\displaystyle\int_0^{\frac{\pi}{4}}\frac{\sec^2 x\,dx}{1+\tan x}$ is equal to

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

(19) If $\displaystyle\int\frac{du}{u^2-a^2}=\frac{1}{2a}\ln\left|\frac{u-a}{u+a}\right|+C$, then $\displaystyle\int\frac{dx}{x^2-6x}$ is equal to:

(a) $\dfrac{1}{6}\ln\left|\dfrac{x+6}{x}\right|+C$
(b) $\dfrac{1}{2}\ln\left|\dfrac{x+6}{x}\right|+C$
(c) $\dfrac{1}{2}\ln\left|\dfrac{x-6}{x}\right|+C$
(d) $\dfrac{1}{6}\ln\left|\dfrac{x-6}{x}\right|+C$
(e) $\dfrac{1}{6}\ln\left|\dfrac{x-3}{x+3}\right|+C$

(20) $\displaystyle\int_1^e \ln x^2\,dx$ is equal to

(a) 0.
(b) $4e-2$.
(c) -2
(d) $e-2$.
(e) 2.

(21) $\int 6^{x-1}\, 3^{1-x}\, dx$ is equal to

(a) $2^x \ln 2 + C.$

(b) $\dfrac{2^{x+1}}{\ln 2} + C.$

(c) $2^{x+1} \ln 2 + C.$

(d) $\dfrac{2^x}{2 \ln 2} + C.$

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

(22) The integral $\int_{-1}^{2} x \sin\sqrt{x}\, dx + \int_{2}^{-1} x \sin\sqrt{x}\, dx + \int_{\pi}^{\pi} x \sin\sqrt{x}\, dx$ is equal to

(a) 1

(b) 0.

(c) $\pi \cos\sqrt{\pi}.$

(d) $\pi \cos\sqrt{\pi} - 1.$

(e) 3.

(23) $\int \dfrac{x+2}{x+1} dx$ is equal to:

(a) $x^2 + 2x + \ln|x+1| + C.$

(b) $x - \ln|x+1| + C.$

(c) $x + \ln|x+1| + C.$

(d) $x^2 + 2x - \ln|x+1| + C.$

(e) $2x + \ln|x+1| + C.$

(24) $\dfrac{d}{dx}\left[\int_0^x e^{t^2+5}\, dt\right]$ is equal to:

(a) e^{x^2+5}

(b) 0

(c) 1

(d) $\ln 5.$

(e) $e^5.$

(25) A cube of ice is melting so that each side is decreased from 6 *cm* to 5.5 *cm*. Using differentials, the change in the volume can be approximated as:

(a) 216 $cm.^3$

(b) –36 $cm.^3$

(c) 36 $cm.^3$

(d) 54 $cm.^3$

(e) –54 $cm.^3$

(26) If $C = 7 + 0.6I - 0.25\sqrt{I}$ is the consumption function of a certain country, (where I is the income in billions of dollars), then the **marginal propensity to save when I = 25** is

(a) $\frac{17}{40}$.

(b) $\frac{23}{40}$.

(c) $\frac{35}{40}$.

(d) $\frac{35}{4}$.

(e) $\frac{15}{40}$.

(27) A stone is thrown straight up into the air, and after t seconds its height was $h(t) = 48t - 16t^2$ feet. The maximum height the stone can reach is:

(a) 12 ft.
(b) 16 ft.
(c) 36 ft.
(d) 72 ft.
(e) 48ft.

(28) If $f(x, y) = \ln(x^2 + y^2)$ then $(x f_x + y f_y)(x, y)$ is equal to

(a) $\ln 2$.
(b) 0.
(c) 1.
(d) 2.
(e) $\frac{4}{\ln 2}$

(29) The weekly profit, $P(x, y)$, from selling x cars and y trucks is given by $P(x, y) = 2500 + 3x^2 - 2xy + y^2 - 8y$. 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 $x = 4$, and $y = 6$.
(d) minimum profit when $x = 2$, and $y = 6$.
(e) maximum profit when $x = 6$, and $y = 4$.

(30) 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 $k = 0$.

Answers: badce baacd eebca bacde dbcae acddb