KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 132 -FINAL EXAM

Wednesday - January 9, 2002

Test Code: 1

Dr. Mohammad Z. Abu-Sbeih TIME: 12:30 - 3:30 P.M.

Serial Number:_____

Student Number:_____ Section Number:_____

Name:_____

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.

2. The test code is already typed and bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.

3. When bubbling, make sure that the bubbled space is fully covered.

4. Check that the exam paper has 25 different questions.

(1) $\lim_{x\to\infty}[\sqrt{x^2+2x}-x]$ is equal to:

(a) 0.
(b) 3.
(c) 2.
(d) 1.
(e) ∞.

(2) The equation of the tangent line to the curve $xy^2+x^2y=2$ at the point (1, 1) is

(a) $y=-x+2$
(b) $y=x+2$.
(c) $y=x-2$.
(d) $y=x+1$.
(e) $y=-x-2$.

(3) If $y=\dfrac{2\sin x}{\cos x+\sin x}$ then y' at $x=\dfrac{p}{4}$ is:

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

(4) Let $f(x)=\dfrac{x+3}{x^2+x-6}$, which of the following is **true**:

(a) The graph has x- intercept at $x=-3$.
(b) The graph has two vertical asymptotes.
(c) The graph has no maximum but one local minimum.
(d) The graph has only one vertical asymptote and only one horizontal asymptote.
(e) The graph has one inflection point.

(5) Which of the following is **false** about the graph of the function $f(x)=x^3-3x+2$.

(a) The graph is decreasing on the interval (-1, 1).
(b) The graph has absolute minimum on the interval (-1, 1).
(c) The graph has local max. at the point (-1, 4) and local min. at the point (1, 0).
(d) The graph is concave down on $(-\infty,0)$ and concave up $(0,\infty)$.
(e) The graph has only one inflection point (0, 2).

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

$$f(x)=\begin{cases} x^2+1 & if \quad x\geq -1 \\ 3x+A & if \quad x<-1 \end{cases}$$

continuous is:

(a) -5.
(b) 1.
(c) 5.
(d) -1.
(e) 3.

(7) A manufacturer wants to design a rectangular box with square bottom and open top, having a storage capacity of 500 cubic ft The dimensions of the box which requires

(a) the least amount of metal are $\sqrt{5}\times\sqrt{5}$ for the bottom and height 100 ft.
(b) the maximum amount of metal are $\sqrt{10}\times\sqrt{10}$ for the bottom and height 50 ft.
(c) the maximum amount of metal are 10×10 for the bottom and height 5 ft.
(d) the least amount of metal are $\sqrt{10}\times\sqrt{10}$ for the bottom and height 50 ft.
(e) the least amount of metal are 10×10 for the bottom and height 5 ft.

(8) A company currently sells 850 books monthly at a price of $75 each. For each additional dollar the company charges, the public will buy 10 fewer books monthly. What price should the company charge for each book to maximum the monthly revenue?

(a) $80.
(b) $72.5.
(c) $75.
(d) $77.5.
(e) $70.

(9) The area bounded by the graphs of $f(x)=x+1 \quad and \quad g(x)=x^2-1$ is equal to:

(a) $\frac{1}{3}$.
(b) $\frac{9}{2}$.
(c) $\frac{4}{3}$.
(d) $\frac{2}{3}$.
(e) 1.

(10) The slope of the line tangent to the graph of $y=\ln\sqrt{x}+2^{2x-1}+p^2$ when x = 1 is

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

(11) The profit $P(x, y)$ from selling x radioss and y tv's is $P(x, y) = 8500 - 2x^2 + xy - y^2 + 49y$. The company will make:

(a) maximum profit when $x = 14$, and $y = 14$.
(b) minimum profit when $x = 14$, and $y = 14$.
(c) maximum profit when $x = 7$, and $y = 28$.
(d) minimum profit when $x = 7$, and $y = 28$.
(e) maximum profit when $x = 14$, and $y = 28$.

(12) If $f(x, y) = \cos(x + y) + \ln(xy)$ then the number of points (x , y) for which $f_{xx} = f_{yy}$ is:

(a) 0.
(b) 1.
(c) 2.
(d) 4.
(e) infinite.

(13) If $y = (1 + 2\sin x)^{\sec x}$ then $f'(0)$ is equal to:

(a) 0.
(b) 1.
(c) e.
(d) 2.
(e) e^2.

(14) If $g(x, y, z) = z^x - \sqrt{\sin(x^2 + y^2)} + y^3 z^2$ then $g_z(1, 2, 3)$ is equal to:

(a) 49.
(b) $5\cos\sqrt{5} + 37$.
(c) 73.
(d) $\frac{5}{\sqrt{5}}\cos\sqrt{2} + 37$.
(e) 37.

(15) Which of the following statements is **true** about the surface represented by the equation $x^2 + y^2 = 1$ in space?

(a) The surface is a sphere with radius 1.
(b) The surface is a circular cylinder (tube) whose axis is the z-axis.
(c) The surface is a plane, which does not intersect the z-axis.
(d) The surface is a circle with radius 1.
(e) The surface intersects the x, y – plane at one point.

(16) $\int \frac{dx}{1+\cos x}$ is equal to

(a) $\frac{1}{(1+\cos x)^2}+C$

(b) $\csc x+\cot x+C$.

(c) $\cot x-\csc x+C$

(d) $\ln|1+\cos x|+C$.

(e) $\csc x-\cot x+C$.

(Hint: Multiply by the conjugate)

(17) If $\int \frac{du}{[u^2-a^2]^{\frac{3}{2}}}=\frac{-u}{a^2\sqrt{u^2-a^2}}+C$, then $\int_1^2 \frac{dx}{(x^2+2x)^{\frac{3}{2}}}$ is equal to:

(a) $-\frac{3\sqrt{3}+4\sqrt{2}}{2\sqrt{6}}$.

(b) $\frac{3\sqrt{3}-4\sqrt{2}}{2\sqrt{6}}$.

(c) $\frac{3\sqrt{3}+4\sqrt{2}}{2\sqrt{6}}$.

(d) $\frac{2}{\sqrt{3}}-\frac{3}{\sqrt{8}}$.

(e) $\frac{3}{2}\ln\frac{8}{3}$.

(18) $\int 4x\ln\sqrt{x}\,dx$ is equal to

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

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

(c) $x^2(\ln x-\frac{1}{4})+C$

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

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

(19) $\int\left[\frac{1}{(1-x)^2}+\frac{1}{x-1}\right]dx$ is equal to

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

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

(c) $\frac{1}{x-1}+\ln|x-1|+C$.

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

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

(20) The area bounded by the two graphs $f(x) = x^3 - 1$ and $g(x) = x - 1$ is equal to:

(a) $\frac{1}{4}$.
(b) $\frac{1}{12}$.
(c) 1.
(d) 2.
(e) $\frac{1}{2}$.

(21) $\int_0^1 \frac{x}{x+1}\,dx$ is equal to:

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

(22) $\int_0^{\frac{p}{4}} 2^{\tan x} \sec^2 x\,dx$ is equal to:

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

(23) The average cost equation of a certain product is $\overline{C} = x^2 - 10x + \frac{20000}{x}$, where x is the number of units produced. The marginal cost when 50 units are produced is:

(a) 6000.
(b) 6500.
(c) 7000.
(d) 7500.
(e) 5000.

(24) The volume of the sphere of radius r is given by $V = \frac{4}{3}p\,r^3$. Using differentials to approximate the amount of paint needed to paint a sphere of radius 4cm with a layer of thickness 0.05 cm, we get:

(a) $32p\ cm^3$.
(b) $0.8p\ cm^3$.
(c) $9.6p\ cm^3$.
(d) $1.6p\ cm^3$.
(e) $3.2p\ cm^3$.

(25) The solution to the equation $y'' = x + e^{2x}$ subject to the conditions $y'(0) = y(0) = 1,$ is:

(a) $y = \frac{x^2}{4} + \frac{1}{2}e^{2x} + \frac{1}{2}.$

(b) $y = \frac{x^2}{4} + \frac{1}{2}e^{2x} + \frac{1}{2}x + 1.$

(c) $y = \frac{x^3}{6} + \frac{1}{4}e^{2x} + \frac{1}{2}x + \frac{3}{4}.$

(d) $y = \frac{x^3}{6} + \frac{1}{4}e^{2x} + \frac{1}{2}x + 1.$

(e) $y = \frac{x^3}{6} + \frac{1}{4}e^{2x} + \frac{1}{2}x.$

Answers: dabdb ceabd cedab edace cabec