KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 132 - FINAL EXAM

Monday – December 30, 2013

Test Code: 1

Dr. Mohammad Z. Abu-Sbeih TIME: 12:30 – 3:00 P.M.

Student Number:	Serial Number:

Name:

Important Notes

DO NOT USE CALCULATORS OF ANY TYPE

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) $\lim_{x \to 0} \dfrac{\tan 2x}{\sin 2x - 1}$ is equal to:

(a) ∞.
(b) 1.
(c) -1.
(d) 0.
(e) Does not exist.

(2) The slope of the tangent line to the curve $xy^2 + x^2 y = 6$ at the point (1, 2) is

(a) - 8/5
(b) 2.
(c) -9/5.
(d) -2.
(e) -12.

(3) If $y = \sec 2x + \cot x^3$ then y' is:

(a) $2\sec 2x \tan 2x + 3x^2 \csc x^3$.
(b) $2\sec 2x \tan 2x - 3x^2 \csc^2 x^3$.
(c) $2\sec x \tan x + 3x^2 \csc x^3$.
(d) $2\sec 2x \tan 2x - 3x^2 \csc x^3 \, \mathrm{c}\cot x^3$.
(e) $2\sec x \tan x + 3x^2 \csc^2 x^3$.

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

(a) The function has two critical points
(b) The graph has no *x*- intercept.
(c) The graph has no inflection point.
(d) The graph has one local maximum but no local minimum points.
(e) The graph is concave down on the interval $(0, \infty)$

(5) Which of the following is **true** about the graph of the function $f(x) = x^4 - 2x^3 + 2x$.

(a) The graph is decreasing on the interval $(-\infty, 1)$

(b) The graph has two inflection points at $x = 0$ and at $x = 1$

(c) The graph has absolute minimum and absolute maximum.

(d) The graph has local minimum at the point (1, 0)

(e) The graph is concave down on $(-\infty, 0)$ and concave up $(0, \infty)$

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

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

Continuous every where are:

(a) $a = 3$ and at $b = 4$

(b) $a = 2$ and at $b = 4$

(c) $a = 2$ and at $b = 5$

(d) $a = 3$ and at $b = 5$

(e) $a = 2$ and at $b = 3$

(7) A manufacturer wants to design a can with circular bottom, having a storage capacity of 250π cubic ft. The least amount of metal needed to make the can is

(a) 250π ft^2.

(b) 200π ft^2.

(c) 100π ft^2.

(d) 120π ft^2.

(e) 150π ft^2.

(8) The closest distance from the origin to the line $2x + y = 2$ is

(a) $\frac{2}{\sqrt{5}}$ (b) $2\sqrt{5}$ (c) $\sqrt{5}$ (d) $\frac{3}{\sqrt{5}}$ (e) $3\sqrt{5}$

(9) The area bounded by the graphs of $y = x^3 - x$ and the x – axis is equal to:

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

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

(c) $\frac{1}{3}$.

(d) $\frac{2}{3}$.

(e) 1.

(10) The slope of the line tangent to the graph of $y = 3^x + \ln\sqrt{x^2+1} + e^2$ when x = 1 is

(a) $\frac{1}{2} + 3\ln 3 + 2e$

(b) $1 + 3\ln 3 + 2e$.

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

(d) $\frac{1}{2} + 3\ln 3$

(e) $3 + 3\ln 3$

(11) The profit $P(x, y)$ from selling x computers and y printers 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 $f(x, y) = xy + \sin(\frac{x}{y})$, then $\frac{x}{y} f_x + f_y =$

(a) $x + y + \frac{2x}{y^2}\cos(\frac{x}{y})$
(b) $2x + \frac{2x}{y^2}\cos(\frac{x}{y})\, 2y$
(c) $x + y$.
(d) $2y$
(e) $2x$

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

(a) $54 + 27\ln 3$
(b) $81 + 54\ln 3$
(c) $81\ln 3$
(d) $54 + 81\ln 3$
(e) $2 + 3\ln 3$

(14) If $z = \ln(4 - x^2 - y^2)$ then $yz_x - xz_y =$

(a) 0
(b) 1
(c) $\dfrac{-2xy}{4 - x^2 - y^2}$
(d) $\dfrac{2(x+y)}{4 - x^2 - y^2}$
(e) $\dfrac{-2(x+y)}{4 - x^2 - y^2}$

(15) The function $f(x, y) = 3xy - x^3 - y^3$ has

(a) only relative maximum at (1,1).
(b) saddle point at (0,0) and relative maximum at (1,1).
(c) saddle point at (0,0) and relative minimum at (1,1).
(d) only one relative minimum at (1,1).
(e) one local maximum at(0,0) and one local minimum (1,1).

(16) $\displaystyle\int \frac{\csc^2 x\, dx}{1 + \cot x}$ is equal to

(a) $\dfrac{1}{(1+\cot x)^2} + C$
(b) $\dfrac{-1}{(1+\cot x)^2} + C$.
(c) $\cot x - \csc x + C$
(d) $\ln|1 + \cot x| + C$.
(e) $-\ln|1 + \cot x| + C$.

(17) If $\int \frac{du}{[u^2 \pm a^2]^{\frac{3}{2}}} = \frac{\pm u}{a^2 \sqrt{u^2 \pm a^2}} + C$, then $\int_0^1 \frac{dx}{(x^2+2x+2)^{\frac{3}{2}}}$ is equal to:

(a) $\frac{2\sqrt{2}-\sqrt{10}}{\sqrt{10}}$

(b) $\frac{\sqrt{2}+\sqrt{5}}{\sqrt{10}}$

(c) $\frac{2\sqrt{2}+\sqrt{5}}{\sqrt{10}}$

(d) $\frac{2\sqrt{2}-\sqrt{5}}{\sqrt{10}}$

(e) $\frac{\sqrt{2}-\sqrt{5}}{\sqrt{10}}$

(18) $\int \frac{x^2}{x+1} dx$ is equal to

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

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

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

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

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

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

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

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

(e) $\frac{1}{(1+x)^3} + \ln|x+1| + C.$

(20) The area bounded by the two graphs $f(x) = x^4$ and $g(x) = 2 - x^2$ is equal to:

(a) $\frac{22}{15}$ (b) $\frac{33}{15}$ (c) $\frac{24}{15}$ (d) 3 (e) $\frac{44}{15}$

(21) $\int (x-1)e^x\,dx$ is equal to:

(a) $(x-1)e^x + C$

(b) $(x^2 - x)e^x + C$

(c) $e^x(x-2) + C$

(d) $e^x(x+2) + C$

(e) $e^x(x^2-2) + C$

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

(a) $\frac{1}{\ln 2}$.

(b) 1

(c) $-\ln 2$.

(d) $\ln 2$.

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

(23) Chose the correct statement for the function $y = e^x + e^{-x}$

(a) The graph is increasing on the interval $(-\infty, 1)$
(b) The graph is decreasing on the interval $(-\infty, 0)$
(c) The graph has no critical points
(d) The graph has one inflection point
(e) The graph is concave down $(-\infty, \infty)$

(24) The volume of the sphere of radius r is given by $V = \frac{4}{3}\pi r^3$. Using differentials to approximate the amount of paint needed to paint a sphere of ***diameter*** 10 cm with a layer of thickness 0.1 cm, we get:

(a) $25\pi\ cm^3$.
(b) $50\pi\ cm^3$.
(c) $100\pi\ cm^3$.
(d) $\pi\ cm^3$.
(e) $10\pi\ cm^3$.

(25) Using differentials to approximate $\sqrt[3]{8.12}$ we get

(a) 2.2
(b) 2.1
(c) 2.01
(d) 2
(e) 2.001

Answers: dabdb ceabd cedab edace cabec