KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

DEPARTMENT OF MATHEMATICS AND STATISTICS

# MATH 132 -FINAL EXAM

Thursday – August 23, 2007 - ( 063)

## Test Code: 2

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

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Serial Number: ________________

Student Number: _______________

Section Number: **4**

Name: _____________________________________

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**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 +1 different questions.

(1) we If $f(x) = \sqrt{x}$, then $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ is equal to

(a) $2\sqrt{x}$.
(b) $\frac{-1}{2\sqrt{x}}$.
(c) doesn't exist.
(d) $\frac{1}{2\sqrt{x}}$.
(e) $\frac{1}{\sqrt{x}}$.

(2) The slope of the line tangent to the graph of $1 + e^{xy} = 2x - y$ at the point $(1,0)$ is

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

(3) The **average cost** function for a certain product is $\bar{c}(q) = 0.01q^2 - 0.02q + 14 + \frac{500}{q}$. The **marginal cost** when 100 units are produced is equal to

(a) 300.
(b) 310.
(c) 320.
(d) 330.
(e) 340.

(4) The $\lim_{x \to 2} \frac{|2x - 4|}{x - 2}$

(a) is equal to 1.
(b) is equal to -1.
(c) is equal to 2.
(d) does not exist.
(e) is equal to -2.

(5) The equation of the tangent line to the curve $y = \frac{x}{x+1}$ at the point (1, 1) is

(a) $y = 2x$.
(b) $4y = x + 3$.
(c) $4y = x - 4$.
(d) $4y = x - 5$.
(e) $4y = x - 3$.

(6) Which of the following statements is **True** about the graph of the function $f(x) = 3x^4 - 4x^3 + 1$

(a) The graph has relative maximum at $x = 0$ and relative minimum at $x = 1$.
(b) The graph has relative minimum at $x = 0$ and relative maximum at $x = 1$.
(c) The graph has one relative minimum and no relative maximum.
(d) The graph has only one asymptote.
(e) The graph has one relative maximum and no relative minimum.

(7) Which of the following statements is **false** about the graph of the function $f(x) = \frac{2x+1}{x-1}$.

(a) The graph has a vertical asymptote $x = 1$.
(b) The graph has a horizontal asymptote $y = 2$.
(c) The graph has no critical points.
(d) The graph has no inflection points.
(e) The graph is always concave up.

(8) The function $f(x) = \frac{x^2 - 1}{x^2 + x - 2}$ is discontinuous at

(a) 1 and -2.
(b) -1 and 2.
(c) 1 and -1.
(d) 1, -1, and -2.
(e) 1, -1, and 2.

(9) The demand equation for a certain product is $p = 42 - 4q$ where $p$ is the price and $q$ is the number of units. The average cost function is $\bar{c}(q) = 2 + \frac{80}{q}$. The price $p$ which will maximize the profit is:

(a) 5.
(b) 22.
(c) 20.
(d) 10.
(e) 15.

(10) If we use differentials to approximate $e^{0.001}$ to three decimal places we get

(a) 1.000
(b) 1.010
(c) 0.001
(d) 1.001
(e) 0.999

(11) The consumption function is $C = 6 + \frac{3I}{4} - \frac{\sqrt{I}}{3}$, where $I$ is the income in billions of dollars. The marginal propensity to save when $I = 25$ is

(a) $\frac{43}{60}$.

(b) $\frac{41}{60}$.

(c) $\frac{17}{60}$.

(d) $\frac{13}{60}$.

(e) $\frac{47}{60}$.

(12) If $y = \sin x$ and $x = \ln t$ then $\frac{dy}{dt}$ at $t = 1$ is equal to

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

(13) $\int x \left[ x - \frac{1}{x^2} + \frac{1}{x^3} \right] dx$ is equal to

(a) $3x^2 - \ln x - \frac{1}{x} + C$.

(b) $\frac{x^3}{3} - \ln x - 2\ln x + C$.

(c) $\frac{x^3}{3} - \ln x + \frac{1}{x} + C$.

(d) $\frac{x^3}{3} - \ln x - \frac{1}{x} + C$.

(e) $\frac{x^3}{3} - \ln x + \ln x^2 + C$.

(14) $\int_1^2 \frac{e^{1+\ln x}}{x}\, dx$ is equal to:

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

(15) Which of the following statements is **True** about the function $f(x,y)=\sqrt{1-x^2-y^2}$

(a) $f(x,y)$ has domain $\{(x,y): x^2+y^2\geq 1\}$ and range all real numbers.

(b) $f(x,y)$ has domain $\{(x,y): x^2+y^2\leq 1\}$ and range $[0,1]$.

(c) $f(x,y)$ has domain $\{(x,y): x^2+y^2\geq 1\}$ and range $[0,\infty)$.

(d) $f(x,y)$ has domain $\{(x,y): x^2+y^2\leq 1\}$ and range $[0,\infty)$.

(e) $f(x,y)$ has domain $[0,1]$ and range $[0,1]$.

(16) If $\int \frac{du}{u^2-a^2}=\frac{1}{2a}\ln\left|\frac{u-a}{u+a}\right|+C$, then $\int \frac{dx}{x^2-4x}$ is equal to:

(a) $\frac{1}{4}\ln\left|\frac{x+4}{x}\right|+C$.

(b) $\frac{1}{2}\ln\left|\frac{x+4}{x}\right|+C$.

(c) $\frac{1}{4}\ln\left|\frac{x-2}{x+2}\right|+C$.

(d) $\frac{1}{2}\ln\left|\frac{x-4}{x}\right|+C$.

(e) $\frac{1}{4}\ln\left|\frac{x-4}{x}\right|+C$.

(17) Which of the following statements is **false** about the graph of the function $f(x)=x^{\frac{2}{3}}$.

(a) The graph has absolute minimum at (0, 0).

(b) The graph has one critical value at $x=0$.

(c) The graph is decreasing on the interval $(-\infty,0)$ and increasing on $(0,\infty)$.

(d) The graph has one inflection point (0, 0).

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

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

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

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

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

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

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

(19) $\int \frac{1+\sin x}{\cos^2 x}\,dx$ is equal to:

(a) $\cot x+\sec x+C$.

(b) $\tan x-\sec x+C$.

(c) $\tan x+\sec x+C$.

(d) $-\cos^{-1}x+\ln\cos x+C$.

(e) $\tan x+\csc x+C$.

(20) If $f(x,y)=\sin(x^2+y^2)$ then $f_{xx}(0,0)+f_{yy}(0,0)$ is equal to:

(a) 0.
(b) 1.
(c) 2.
(d) 8.
(e) 4.

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

(a) Relative maximum at (1,1) and relative minimum at (0,0).
(b) relative maximum at (1,1) and saddle point at (0,0).
(c) relative minimum at (1,1) and saddle point at (0,0).
(d) relative minimum at (1,1) and relative maximum at (0,0)..
(e) no relative extrema.

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

(a) $ 45.
(b) $ 44.
(c) $ 41.
(d) $ 50.
(e) $ 42.

(23) If $y=(1+2x)^x$ then $y'$ at the point $(1,3)$ is equal to:

(a) $2+\ln 9$.
(b) $2+\ln 27$.
(c) $3+\ln 9$.
(d) $\frac{2}{3}+3\ln 3$.
(e) $\frac{2}{3}+\ln 3$.

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

(a) 0.
(b) 2.
(c) 3.
(d) 4.
(e) 9.

(25) $\int x\ 2^x\ dx$ is equal to:

(a) $x\,2^x\ln 2-2^x(\ln 2)^2+C$ .
(b) $\frac{x\,2^x}{\ln 2}+\frac{2^x}{(\ln 2)^2}+C$ .
(c) $\frac{x\,2^x}{\ln 2}-\frac{2^x}{(\ln 2)^2}+C$ .
(d) $x\,2^x\ln 2+2^x(\ln 2)^2+C$ .
(e) $\frac{x^2}{2}-\frac{2^x}{\ln 2}+C$ .

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

(a) $k = 0$ only.
(b) $k = e$ and $k = 0$.
(c) $k = 1$ and $k = 0$.
(d) $k = 1$ only.
(e) $k = 1$ and $k = e$.