

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 132 -FINAL EXAM

Tuesday - January 22, 2008

Test Code: 1

Dr. Mohammad Z. Abu-Sbeih

TIME: 7:00 - 10:00 A.M.

Serial Number: _____

Student Number: _____

Section Number: _____

Name: _____

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) The $\lim_{x \rightarrow 1} \frac{x^2 - x}{x^2 + x - 2}$

- (a) is equal to 1.
- (b) is equal to 0.
- (c) is equal to $\frac{1}{2}$.
- (d) is equal to $\frac{1}{3}$.
- (e) does not exist.

(2) The set of value(s) of the constant c which will make the function

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

continuous is:

- (a) $\{-3, 4\}$.
- (b) $\{3, 4\}$.
- (c) $\{-3\}$.
- (d) $\{3, -4\}$.
- (e) $\{4\}$.

(3) The equation of the tangent line to the curve $y = \frac{\sin 2x}{x + 2}$ at the point $(0, 0)$ is

- (a) $y = 2x$.
- (b) $y = x$.
- (c) $y = 2x - 1$.
- (d) $4y = x + 1$.
- (e) $2y = x - 1$.

(4) The $\lim_{h \rightarrow 0} \frac{\sqrt{4+h} - 2}{h} =$

- (a) 0
- (b) 2
- (c) Does not exist
- (d) $\frac{1}{4}$
- (e) $\frac{1}{2}$

(5) The **average profit** function for a certain product is $\bar{p}(q) = 0.01q^2 - 0.02q + 14 + \frac{7900}{q}$. The **marginal profit** when 100 units are sold is equal to

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

(6) The consumption function is $C = 21 + \frac{3I}{4} - \frac{\sqrt{I}}{3}$, where I is the income in billions of dollars.

The marginal propensity to save when the income $I = 4$ is

- (a) $\frac{2}{3}$
- (b) $\frac{1}{12}$
- (c) $\frac{1}{3}$
- (d) $\frac{5}{6}$
- (e) $\frac{1}{6}$

(7) If $y = x - \ln x$ and $x = t + \cos t$ then $\frac{dy}{dt}$ at $t = 0$ is equal to

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

(8) The slope of the line tangent to the graph of $2 - 2x + y + xy = 10$ at the point $(1, 0)$ is

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

(9) If $y = \log_3 \sqrt{\frac{x^2 + 1}{x^3 + x + 2}}$ then $y'(1) =$

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

(10) Which of the following statements is **false** about the graph of the function $f(x) = 5 + x^{\frac{2}{3}}$.

- (a) The graph has absolute minimum at $(0, 5)$.
- (b) The graph has no inflection point at $(0, 5)$.
- (c) The graph has vertical tangent at $(0, 5)$.
- (d) The graph has vertical asymptote at $(0, 5)$.

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

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

- (a) The graph has local maximum at $x = 0$ and local minimum at $x = 1$.
- (b) The graph has local minimum at $x = 0$ and local maximum at $x = 1$.
- (c) The graph has only one local extrema.
- (d) The graph is always concave up.
- (e) The graph has one inflection point.

(12) 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 decreasing on $(-\infty, \infty)$.

(13) The demand equation of selling q units at price p riyal is $p = 200 - \frac{q}{2}$. The cost in riyals of producing q units is $C(q) = 300 + \frac{1}{4}q^2$. The estimated profit from selling the 25th unit is

- (a) 176 riyals
- (b) 162.5 riyals
- (c) 188 riyals
- (d) 164 riyals
- (e) 175 riyals

(14) A company currently sells 800 bicycles monthly at a price of \$75 each. For each additional dollar the company charges, the public will buy 10 fewer bicycles monthly. What price should the company charge for each bicycle to maximum the monthly revenue?

- (a) \$77.5.
- (b) \$72.5.
- (c) \$75.
- (d) \$80.
- (e) \$79.

(15) The area bounded by the graphs of $f(x) = x - 1$, $g(x) = 5 - 2x$ and $x = 0$ is equal to:

- (a) 3.
- (b) 6.
- (c) 12.
- (d) 4.
- (e) 2.

(16) If $y = \sqrt{e^{x-1}} + \ln|x| + \pi^2$ then $y'(1) =$

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

(17) The area bounded by the graphs of $x = y + 1$, and $x = y^3 + 1$ is equal to:

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

(18) The integral $\int \left(\frac{1}{x-1} - \frac{1}{(x+1)^2} \right) dx$ is equal to

- (a) $\ln|x-1| + \frac{1}{x+1} + C$.
- (b) $\ln|x-1| - \frac{1}{x+1} + C$.
- (c) $\ln|x-1| + 2\ln|x+1| + C$.
- (d) $\ln|x-1| - 2\ln|x+1| + C$.
- (e) $\ln|x-1| + \frac{2}{(x+1)^3} + C$.

(19) The integral $\int_0^3 \frac{x}{\sqrt{x+1}} dx$ is equal to:

- (a) 2
- (b) $\frac{4}{3}$
- (c) $\frac{8}{3}$
- (d) $\frac{2}{3}$
- (e) 3

(20) The integral $\int_0^1 e^{3+\ln x} dx$ is equal to:

- (a) $\frac{2e}{3}$
- (b) $\frac{e}{3}$

- (c) e^3
 (d) $\frac{e^3}{3}$
 (e) $\frac{e^3}{2}$

(21) The integral $\int x \cos x \, dx$ is equal to

- (a) $x \sin x - \cos x + C$
 (b) $x \cos x + \sin x + C$
 (c) $x \sin x + \cos x + C$
 (d) $x \cos x - \sin x + C$
 (e) $\sin x + \cos x + C$

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

- (a) $\frac{1}{2} \ln \left| \frac{x-2}{x} \right| + C$
 (b) $\frac{1}{4} \ln \left| \frac{x+4}{x} \right| + C$
 (c) $\frac{1}{2} \ln \left| \frac{x}{x-2} \right| + C$
 (d) $\frac{1}{4} \ln \left| \frac{x+2}{x} \right| + C$
 (e) $\frac{1}{2} \ln \left| \frac{x+2}{x} \right| + C$

(23) The equation of the plane that is parallel to the y,z-plane and passes through the point (2,1,-3) is

- (a) $y = 1$
 (b) $x = 2$
 (c) $z = -3$
 (d) $2x + y - 3z = 0$
 (e) $x + y + z = 0$

(24) The weekly profit, $P(x, y)$, from selling x cars and y trucks is given by

$$P(x, y) = 2008 + 3x^2 - 2xy + y^2 - 8y.$$

The company will make:

- (a) maximum profit when $x = 2$, and $y = 6$.
 (b) minimum profit when $x = 3$, and $y = 3$.
 (c) maximum profit when $x = 6$, and $y = 4$.
 (d) minimum profit when $x = 4$, and $y = 6$.
 (e) minimum profit when $x = 2$, and $y = 6$.

(25) If $f(x, y) = e^{x^2 + y^2 - 2xy}$ then $f_{xy}(1, 1) =$

- (a) 2.
 (b) 0.

- (c) -2.
- (d) 4.
- (e) -4.

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

Answers to the final Exam of Math 132 for the Sem o71

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