King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics

Math 101
Final Exam
063
Thursday 23/8/2007

EXAM COVER

Number of versions: 4
Number of questions: 24
Number of Answers: 5 per question

This exam was prepared using mcqs
For questions send an email to Dr. Ibrahim Al-Lehyani (iallehyani@kaau.edu.sa)

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Math 101
Final Exam
063
Thursday 23/8/2007
Net Time Allowed: 150 minutes

MASTER VERSION

1. $\lim_{x \to 2^+} \dfrac{4 - x^2}{(x-2)^2} =$

(a) $-\infty$

(b) ∞

(c) 4

(d) 0

(e) -4

2. $\lim_{x \to 0} \dfrac{(4+x)^{-1} - 4^{-1}}{x} =$

(a) $\dfrac{-1}{16}$

(b) $\dfrac{1}{16}$

(c) $\dfrac{-1}{4}$

(d) 0

(e) does not exist

3. If $f(x) = \dfrac{x^2+1}{e^{3x}}$, then $f'(1) =$

(a) $\dfrac{-4}{e^3}$

(b) 0

(c) $\dfrac{-4}{e^6}$

(d) $\dfrac{2}{e^5}$

(e) $\dfrac{8}{e^3}$

4. The critical values of $g(t) = t^2\,(2t-5)^{1/3}$ are

(a) $\left\{0, \dfrac{5}{2}, \dfrac{15}{7}\right\}$

(b) $\left\{0, \dfrac{15}{7}\right\}$

(c) $\left\{0, \dfrac{5}{2}\right\}$

(d) $\left\{\dfrac{5}{2}, \dfrac{15}{7}\right\}$

(e) $\{0\}$

5. If $f(x) = 3x^{2/3} - x$, then $f(x)$ is increasing on the interval

(a) $(0, 8)$

(b) $(8, \infty)$

(c) $(-\infty, 0)$

(d) $(0, \infty)$

(e) $(-\infty, 8)$

6. The graph of $y = \ln(x^3 + 1)$ is concave up on the interval

(a) $(0, \sqrt[3]{2})$

(b) $(-\infty, -1)$ and $(0, \sqrt[3]{2})$

(c) $(0, 2)$

(d) $(-1, 2)$

(e) $(0, \infty)$

7. If $f(x) = \begin{cases} c & \text{if } x = -3 \\ \dfrac{9 - x^2}{4 - \sqrt{x^2 + 7}} & \text{if } -3 < x < 3 \\ d & \text{if } x = 3 \end{cases}$,
then f is continuous on $[-3, 3]$ if

(a) $c = 8,\ d = 8$

(b) $c = 8,\ d = -8$

(c) $c = -8,\ d = 8$

(d) $c = 0,\ d = 0$

(e) $c = 1,\ d = -1$

8. If $y = \left(\dfrac{\cos x}{1 + \sin x}\right)^4$, then $\dfrac{dy}{dx} =$

(a) $\dfrac{-4\cos^3 x}{(1 + \sin x)^4}$

(b) $\left(\dfrac{-4\sin x}{\cos x}\right)\left(\dfrac{\cos x}{1 + \sin x}\right)^3$

(c) $4\left(\dfrac{\cos x}{1 + \sin x}\right)^3$

(d) $-4\left(\dfrac{\sin x}{\cos x}\right)^3$

(e) 0

9. $\lim_{x\to\infty}(x-\sqrt{x^2-3x}) =$

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

(b) 3

(c) $\frac{-1}{2}$

(d) 0

(e) ∞

10. $\lim_{x\to 0}\frac{|x-1|-1}{x} =$

(a) -1

(b) ∞

(c) 0

(d) $-\infty$

(e) -2

11. If the curve $y = ax^2 + bx + c$ passes through the point $(2, 30)$ and is tangent to the line $y = 3x$ at the origin, then

(a) $a + b = 9$

(b) $a + b = 7$

(c) $a + b = 6$

(d) $a + b = 3$

(e) $a + b = 2$

12. If

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	1	4	8	3
4	3	3	2	-5

and $F(x) = [f(x)]^2 \cdot g(x)$, then $F'(3) =$

(a) 67

(b) 35

(c) 48

(d) 11

(e) 61

13. The slope of normal line to the curve $x^4y^4 = 16$ at $(2, 1)$ is

(a) 2

(b) -2

(c) $\frac{1}{8}$

(d) $\frac{-1}{2}$

(e) $\frac{1}{2}$

14. If $y = \sqrt[4]{\frac{(4x+1)(x+4)^2}{(x^3+9)(x^2+9)}}$, then $\left.\frac{dy}{dx}\right|_{x=0}$ is

(a) $\frac{3}{4}$

(b) 0

(c) 12

(d) $\frac{9}{2}$

(e) $\frac{\ln 4 - \ln 9}{2}$

15. If $f(x) = \operatorname{sech}^2(\ln(x+2))$, then $f'(0) =$

(a) $\dfrac{-48}{125}$

(b) $\dfrac{-48}{25}$

(c) $\dfrac{-24}{125}$

(d) $\dfrac{-12}{25}$

(e) $\dfrac{12}{25}$

16. A particle moves along the curve $y = \sqrt{1+x^3}$. As it reaches the point $(2, 3)$, the y-coordinate is increasing at a rate of $4\,\text{cm/s}$. At this instant, the x-coordinate is changing at the rate of

(a) 2 cm/s

(b) 4 cm/s

(c) 8 cm/s

(d) 3 cm/s

(e) 6 cm/s

17. The radius of a circle is measured to be 3 m with a possible error of 0.03 m. By using differentials, the **relative** error in the area is

(a) 0.02

(b) 0.03

(c) 0.01

(d) 0.04

(e) 0.06

18. $f(x) = -3x^2 + 5x + 5$ is continuous on $[-3, -1]$ and differentiable on $(-3, -1)$. Then, the value of 'c' that satisfies the conclusion of the Mean Value Theorem is

(a) $c = -2$

(b) $c = \dfrac{-6}{5}$

(c) $c = -1$

(d) $c = 0$

(e) $c = \dfrac{-11}{6}$

19. Given the graph of $y = f'(x)$ i.e. the **graph of first derivative** of function. Then which of the following is **not true**?

(a) $f(0) > f\left(\frac{1}{2}\right)$

(b) $f(4) < f(3)$

(c) f is concave down on $(0, 3)$

(d) f has critical points at $x = 1$ and $x = 5$

(e) $f''(3) = 0$

20. $\lim_{x \to 0} (\cos x)^{1/x^2} =$

(a) $\frac{1}{\sqrt{e}}$

(b) $-\infty$

(c) 0

(d) 1

(e) e^2