

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS  
DEPARTMENT OF MATHEMATICS AND STATISTICS

**Math 102 –Calculus II**

**Exam I**

**Semester 072**

**Test Code: 1**

**Tuesday, March 18, 2008**

**Duration 120 Minutes**

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**Student's Name:** .....

**ID #:** .....

**Section #:** .....

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**Important Instructions:**

1. All types of CALCULATORS, PAGERS, OR MOBILES ARE NOT ALLOWED to be with you during the examination.
2. Use an HB 2 pencil.
3. Use a good eraser. Do not use the eraser attached to the pencil.
4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling your ID number and Section number, be sure that bubbles match with the number that you write.
6. The test Code Number is already typed and bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.
7. When bubbling, make sure that the bubbled space is fully covered.
8. When erasing a bubble, make sure that you do not leave any trace of penciling.
9. Check that the exam paper has **20** questions.

1. The value of  $\int_0^{3\pi/4} |\cos x| dx$  is equal to

(a)  $\frac{1}{9}$

(b) 3

(c)  $\sqrt{2}$

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

(e)  $\frac{3}{\sqrt{2}}$

2.  $\lim_{n \rightarrow \infty} \left( \frac{1}{n} \sum_{i=1}^n \left( 1 + \frac{2i}{n} \right)^3 \right) =$

(a)  $\frac{1}{2} \int_1^3 (1+x)^3 dx$

(b)  $\int_1^3 x^3 dx$

(c)  $\int_1^3 (1+x)^3 dx$

(d)  $\frac{1}{2} \int_1^3 x^3 dx$

(e)  $\int_0^3 x^3 dx$

3. The Riemann sum for  $f(x) = \sin x$ ,  $0 \leq x \leq \pi$ , with 6 equal subintervals, taking the sample points to be left endpoints, is equal to

(a)  $\frac{(2 - \sqrt{3})\pi}{6}$

(b)  $\frac{(2 + \sqrt{3})\pi}{6}$

(c)  $\frac{(2 + \sqrt{2})\pi}{6}$

(d)  $\frac{\pi}{6}$

(e)  $\frac{(3 + \sqrt{2})\pi}{6}$

4. If  $f$  is a continuous function such that

$$\int_1^x e^{-t} f(t) dt = 3 + x \sin x$$

for all  $x$ , then  $f(x) =$

(a)  $e^x + \sin x$

(b)  $x \cos x$

(c)  $e^x(x \cos x + \sin x)$

(d)  $xe^{-x} \sin x$

(e)  $e^{-x} \cos x$

5. Using area under curves to evaluate the integral

$$\int_{-2}^2 (|x| + \sqrt{4 - x^2}) dx,$$

we get

(a)  $8 + \pi$

(b)  $4 + 2\pi$

(c)  $4 + 4\pi$

(d)  $4 + \pi$

(e)  $2\pi$

6.  $\int_0^{\pi/3} \frac{\sin x}{\cos^2 x} dx =$

(a)  $-1$

(b)  $\frac{\sqrt{3}}{2} - 1$

(c)  $2$

(d)  $1$

(e)  $\frac{2}{\sqrt{3}} - 1$

7. If  $F(x) = \int_{x^2}^{x^3} \sqrt{1+t^2} dt$ , then  $F'(\sqrt{2}) =$

(a)  $18 - 2\sqrt{10}$

(b)  $18 + 2\sqrt{10}$

(c) 18

(d)  $12\sqrt{2} - 2\sqrt{5}$

(e)  $2\sqrt{10} - 18$

8. The value of the integral  $\int_0^1 \frac{x^3 + x^2 + x + 1}{x + 1} dx$  is equal to

(a) 1

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

(c) 2

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

(e)  $\frac{7}{3}$

9. If  $A = \int_0^{\pi/2} \sqrt{1 + \sin x} \, dx$ , then

(a)  $\frac{\pi}{2} \leq A \leq \frac{\pi}{\sqrt{2}}$

(b)  $\frac{\pi}{\sqrt{2}} \leq A \leq \pi$

(c)  $1 + \frac{\pi}{2} \leq A$

(d)  $A \leq 1$

(e)  $1 \leq A \leq \frac{\pi}{2}$

10. The limit  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \left[ \frac{4i}{n^2} + \frac{6}{n} \right]$  can be interpreted as

(a) area under the graph of  $y = x$  on  $[0, 2]$

(b) area under the graph of  $y = x + 3$  on  $[3, 5]$

(c) area under the graph of  $y = x$  on  $[3, 5]$

(d) area under the graph of  $y = 4x^2 + 6x$  on  $[3, 5]$

(e) area under the graph of  $y = 2x + 3$  on  $[1, 3]$

11.  $\int (\tan x) \ln(\cos x) dx =$

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

(b)  $\sin x \ln \cos x + C$

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

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

(e)  $-\ln \cos x + C$

12. If the region enclosed by the curves  $y = x$  and  $y = x^2$  is rotated about the line  $x = -1$ , then the volume of the solid obtained is equal to

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

(b)  $\frac{2\pi}{3}$

(c)  $\frac{2\pi}{15}$

(d)  $\frac{\pi}{3}$

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

13.  $\int_0^1 x(1-x)^{10} dx =$

(a)  $\frac{1}{64}$

(b)  $\frac{1}{110}$

(c) 1

(d)  $\frac{1}{11}$

(e)  $\frac{1}{132}$

14. Which one of the following statements is **FALSE**?

(a)  $e = \lim_{x \rightarrow 0} \left(1 + \frac{1}{x}\right)^{1/x}$

(b)  $\ln x = \int_1^x \frac{1}{t} dt \quad x > 0$

(c)  $\frac{d}{dx}(\ln x) = \frac{1}{x}$

(d)  $e$  is the number such that  $\ln e = 1$

(e)  $\int \frac{1}{x} dx = \ln |x| + C$



15. The area between the curves of  $y = x^2 - 1$  and  $y = x + 1$  is
- (a) 5
  - (b) 9
  - (c)  $\frac{9}{4}$
  - (d) 3
  - (e)  $\frac{9}{2}$
16. The volume generated by rotating the region bounded by  $y = \ln x$ ,  $y = 0$ , and  $x = e$  about the  $y$ -axis is equal to
- (a)  $\pi \int_1^e (\ln x)^2 dx$
  - (b)  $\pi \int_0^1 (e - e^y)^2 dy$
  - (c)  $\pi \int_1^e (e - e^y)^2 dy$
  - (d)  $\pi \int_0^1 (e^2 - e^{2y}) dy$
  - (e)  $\pi \int_0^e (e^2 - e^{2y}) dy$

17. Evaluate  $I = \int_0^{13} \frac{dx}{\sqrt[3]{(1+2x)^2}}$

(a) 3

(b) 6

(c)  $\frac{3}{2}\sqrt[3]{13}$

(d)  $\frac{1}{3}$

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

18. Find the area of the region bounded by the graphs of the equations

$$x = 2y^2 \quad \text{and} \quad y^2 = \frac{x}{3} + 3$$

(a) 36

(b) 72

(c)  $\frac{1}{2}\sqrt{6} - 8 + 3\sqrt{3}$

(d) 18

(e)  $\sqrt{6} - 16 + 6\sqrt{3}$

19. A particle moves along a line so that its velocity is  $v(t) = 3t^2 - 2t - 8$  (measured in meters per second). Then the **displacement** of the particle during the time period  $1 \leq t \leq 2$  is given by

(a) 0

(b) 4

(c) -6

(d) 6

(e) -4

20. The region bounded by the graphs of the equations  $2x - y = -1$  and  $y = 5x^2 + 2$  and by the vertical lines  $x = 0$  and  $x = 1$  is revolved about the  $x$ -axis. Find the volume of the resulting solid

(a)  $\frac{34\pi}{3}$

(b)  $\frac{34\pi}{6}$

(c)  $\frac{10\pi}{3}$

(d)  $\frac{5\pi}{3}$

(e)  $\frac{5\pi}{6}$

Q	MM	V1	V2	V3	V4
1	a	d	b	a	b
2	a	d	d	a	a
3	a	b	d	a	d
4	a	c	d	e	c
5	a	b	b	a	c
6	a	d	c	b	a
7	a	a	e	a	d
8	a	d	d	d	c
9	a	a	b	e	e
10	a	c	d	e	e
11	a	a	e	d	d
12	a	e	d	d	d
13	a	e	a	c	a
14	a	a	c	b	e
15	a	e	c	b	d
16	a	d	a	d	a
17	a	a	b	c	e
18	a	a	d	c	b
19	a	e	b	d	c
20	a	a	e	c	b