

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

Calculus II
EXAM I
Semester II, Term 082
Tuesday, March 31, 2009
Net Time Allowed: 120 minutes

MASTER VERSION

1. Using four rectangles and right end points, the estimated area under the graph of $f(x) = 1 + \frac{x^2}{4}$ from $x = -2$ to $x = 6$ is

(a) 36

(b) 40

(c) 18

(d) 24

(e) 34

2. $\int \frac{\cos^2 t}{1 + \sin t} dt =$

(a) $t + \cos t + c$

(b) $1 + \cos t + c$

(c) $\frac{1}{2}t^2 - \cos t + c$

(d) $t - \sin t + c$

(e) $t - \frac{1}{2}\sin^2 t + c$

3. $\int (2 - \sqrt{x})^2 dx =$

(a) $4x - \frac{8}{3}\sqrt{x^3} + \frac{1}{2}x^2 + c$

(b) $\frac{(2 - \sqrt{x})^3}{3} + c$

(c) $4x + \frac{1}{2}x^2 + c$

(d) $4x - x^{2/3} + \frac{1}{2}x^2 + c$

(e) $4x - 6x^{3/2} + x^2 + c$

4. $\int_4^{10} \frac{x}{x^2 - 4} dx =$

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

(b) $3 \ln 2$

(c) $\frac{3}{4} \ln 2$

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

(e) $3 \ln 4$

5. If $F(x) = \int_{\frac{1}{2}}^x f(t) dt$ and $f(t) = \int_{\frac{1}{2}}^{t^2} \frac{\sqrt{1+u^2}}{u} du$, then $F''(1) =$

(a) $2\sqrt{2}$

(b) $\sqrt{2}$

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

(d) $3\sqrt{2}$

(e) $\frac{\sqrt{2}}{6}$

6. If $y = \int_{\sqrt{x}}^{x^3} \sqrt{t} \sin t dt$, then $\frac{dy}{dx} =$

(a) $3\sqrt{x^7} \sin(x^3) - \frac{1}{2\sqrt[4]{x}} \sin \sqrt{x}$

(b) $\sqrt{x^3} \sin x^3 - \sqrt[4]{x} \sin \sqrt{x}$

(c) $\sqrt{x} \sin x^3 - \frac{1}{\sqrt[4]{x}} \sin \sqrt{x}$

(d) $\sqrt{x^3} \sin \sqrt{x} - x^2 \sin x^3$

(e) $x^3 \sin \sqrt{x} - \sqrt{x} \sin x^3$

7. Using the definition of the Area and definite integral, the value of the limit $\lim_{n \rightarrow \infty} \sum_{i=1}^n e^{4 + \frac{3i}{n}} \cdot \frac{2}{n}$ is [Hint: Express the limit as a definite integral].

(a) $\frac{2}{3}[e^7 - e^4]$

(b) e^4

(c) $\frac{2}{3}e^{7/4}$

(d) does not exist

(e) $e^{-3} + e^{-4}$

8. If $f(x) = \begin{cases} x & 0 \leq x \leq 1 \\ \sqrt{1 - (x-1)^2} & 1 \leq x \leq 2 \end{cases}$, and definite ingeral is interpreted as an area, then the value of the integral $\int_0^2 f(x)dx$ is

(a) $(2 + \pi)/4$

(b) $(1 + \pi)/4$

(c) $(3 + \pi)/4$

(d) $(4 + \pi)/4$

(e) $(5 + \pi)/4$

9. $\int_{-1}^2 (x - 2|x|) dx =$

(a) $-\frac{7}{2}$

(b) $-\frac{9}{2}$

(c) $-\frac{5}{2}$

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

(e) $\frac{5}{2}$

10. $\int e^{(2x^5 + \ln x^4)} dx =$

(a) $\frac{1}{10}e^{2x^5} + c$

(b) $e^{(\ln x^4 + 2x^5)} + c$

(c) $\frac{x^5}{5} + \frac{1}{3}x^6 + c$

(d) $e^{(x^4 + 2x^5)} + c$

(e) $\frac{10}{3}e^{(x^4 + 2x^5)} + c$

11. $\int (\sec^2 x) \tan(\tan x) dx =$

(a) $\ln |\sec(\tan x)| + c$

(b) $\ln |\tan(\tan x)| + c$

(c) $-\sec(\tan x) + c$

(d) $\ln |\sin(\tan x)| + c$

(e) $\ln(\sec^2 x) + c$

12. If $\int_0^1 f(x) dx = \pi$, then $\int_0^{\pi/4} f(\sin 2x) \cos 2x dx$ is

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

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

(c) π

(d) 2π

(e) 4π

13. $\int_1^2 \frac{x^2 - 2x - 3}{x^4 - 3x^3} dx =$

(a) $\frac{7}{8}$

(b) $-\frac{1}{8}$

(c) $\frac{9}{8}$

(d) $-\frac{3}{8}$

(e) $\frac{5}{8}$

14. The volume of the solid obtained by rotating the region bounded by the curves $y = x^2$ and $y^2 = x$ about the x -axis is equal to

(a) $3\pi/10$

(b) $37\pi/10$

(c) $\pi/10$

(d) $\pi/6$

(e) $5\pi/6$

15. The base of a solid is the region s bounded by the curves $y = \sqrt{x}$, $y = 0$, $x = 1$ and $x = 2$. If the cross-sections of the solid perpendicular to the x -axis are squares with one side lying along the base, then the volume of the solid is

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

(b) 2

(c) 1

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

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

16. The area enclosed by the line $x + 2y = 1$ and the parabola $y^2 = 4 - x$ is given by the definite integral

(a) $\int_{-1}^3 (3 + 2y - y^2) dy$

(b) $\int_{-1}^3 \left[\frac{1}{2}(1 - x) - \sqrt{4 - x} \right] dx$

(c) $\int_{-1}^3 (y^2 - 2y - 3) dy$

(d) $\int_{-3}^4 \left[\frac{1}{2}(1 - x) - \sqrt{4 - x} \right] dx$

(e) $\int_{-3}^1 (3 - 2y + y^2) dy$

17. The volume of the solid obtained by rotating the region bounded by the curves $y = \frac{1}{x}$, $y = 0$, $x = 1$ and $x = 3$ about the line $y = 1$ is

(a) $2\pi \left(\ln 3 - \frac{1}{3} \right)$

(b) $\pi \left(\ln 3 + \frac{1}{3} \right)$

(c) $2\pi \left(\ln 3 - \frac{2}{3} \right)$

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

(e) $\pi \left(2 \ln 3 - \frac{1}{3} \right)$

18. The area of the region in the right half of the plane bounded by the curves $y = 2x - 1$, $y = x^2$, and $y = -x$ is equal to

(a) $\int_0^{1/3} (x^2 + x) dx + \int_{1/3}^1 (x^2 - 2x + 1) dx$

(b) $\int_0^1 (x^2 - x + 1) dx$

(c) $\int_0^{1/3} (x^2 - x) dx + \int_{1/3}^1 (x^2 + 2x - 1) dx$

(d) $\int_0^1 (x^2 + x - 1) dx$

(e) $\int_0^{1/3} (x - x^2) dx + \int_{1/3}^1 (x^2 - 2x - 1) dx$

19. If we use the definition of $\ln x$ as a definite integral, then an approximation of $\ln 2$ using two rectangles and the sample points to be midpoints is equal to
- (a) $\frac{24}{35}$
 - (b) $\frac{13}{15}$
 - (c) $\frac{12}{35}$
 - (d) $\frac{11}{15}$
 - (e) $\frac{29}{35}$
20. The limit $\lim_{n \rightarrow +\infty} \sum_{i=1}^n \frac{1}{i+n}$ can be interpreted as the
- (a) area under the graph of the function $y = \frac{1}{x}$ on $[2, 4]$
 - (b) area under the graph of the function $y = \frac{1}{x}$ on $[0, 3]$
 - (c) area under the graph of the function $y = \ln x$ on $[2, 4]$
 - (d) area under the graph of the function $y = \ln x$ on $[1, 3]$
 - (e) area under the graph of the function $y = x$ on $[2, 4]$

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Answer Counts

V	a	b	c	d	e
1	5	5	1	4	5
2	5	4	3	2	6
3	4	3	6	4	3
4	2	3	6	5	4

VQ	MQ	Answers
1	4	b e d c a
2	1	d a c e b
3	3	e b c d a
4	2	c e a d b
5	9	c b d a e
6	14	a d e b c
7	16	b d e c a
8	11	e c d b a
9	7	c a e d b
10	12	e b d c a
11	8	e a c d b
12	10	c e d b a
13	6	e b c a d
14	15	d e a b c
15	13	c d b e a
16	5	a d e b c
17	20	b a d c e
18	19	b e c d a
19	17	c a b e d
20	18	e b d a c

VQ	MQ	Answers
1	4	c e b d a
2	3	b c e d a
3	2	a c e d b
4	1	a d c e b
5	7	c b d e a
6	6	b d e c a
7	5	c a b e d
8	10	d e b c a
9	13	b a e c d
10	14	b e a d c
11	8	e c b d a
12	15	d e a b c
13	11	d b c a e
14	9	c b e d a
15	12	b a d e c
16	16	e a b d c
17	18	b e c d a
18	17	a e d b c
19	19	e b c d a
20	20	c a b e d

VQ	MQ	Answers
1	4	c a e d b
2	2	b c e d a
3	3	a d b c e
4	1	e c b a d
5	8	a b e c d
6	9	e c a d b
7	16	a e b d c
8	15	a d b e c
9	6	d c a e b
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14	13	e d b c a
15	10	a e c b d
16	14	e b c a d
17	17	e a d b c
18	19	d c b e a
19	18	b d a c e
20	20	c a d b e

VQ	MQ	Answers
1	4	a e d c b
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4	3	b a e d c
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