King Fahd University of Petroleum and Minerals
Department of Mathematics
Math 102 Sem II (052)

Final Exam **B** Sun 4 / 6 / 2006 Time $2\frac{1}{2}$ hours

Name: ______________________________ I.D.#: ___________________ Serial #: _______

Section # | 17 | | 21 |

Answer all the questions

For the solving part show all of your work

For the multiple choice part mark your answer in the following table

Question #	a	b	c	d	e
1	a	b	c	d	e
2	a	b	c	d	e
3	a	b	c	d	e
4	a	b	c	d	e
5	a	b	c	d	e
6	a	b	c	d	e
7	a	b	c	d	e
8	a	b	c	d	e
9	a	b	c	d	e
10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e

Question #	15	16	17	18	19	20	21	Total
GRADE	/4	/4	/4	/4	/4	/4	/4	/ 28

1. If the region bounded by the curves $y \quad x^2$, x *axis* , and $x \quad 1$ is revolving about $x \quad 2$, then the volume is expressed by the integral

a. $V \quad 2 \; {}_{0}^{2} \; x \quad 1\; x^2 dx$

b. $V \quad 2 \; {}_{0}^{1} \; x^2 \quad 2\; x\, dx$

c. $V \quad 2 \; {}_{0}^{2} \; x \quad 1\; x^2 dx$

d. $V \quad 2 \; {}_{0}^{1} \; x \quad 2\; x^2 dx$

e. $V \quad 2 \; {}_{0}^{2} \; x^2 \quad 1\; x\, dx$

2. The arclength of the curve $y \quad \frac{2}{3}x^{\frac{3}{2}}$ for $x \quad 0$ to $x \quad 3$ is equal to :

a. $\frac{14}{3}$

b. $\frac{26}{7}$

c. $\frac{124}{15}$

d. $\frac{15}{4}$

e. $\frac{22}{5}$

3. One of the following is <u>TRUE</u>

a. $\frac{2}{x^2 \quad 1}dx \qquad \frac{dx}{x \quad 1} \qquad \frac{dx}{x \quad 1}$

b. The series $\displaystyle {}_{n\;0} \left(\frac{3}{2}\right)^{n} \qquad \frac{1}{1 \quad \frac{3}{2}}$

c. ${}_{0}^{1} \sqrt{1 \quad x^2}\; dx \qquad \overline{\;2\;}$

d. The integral ${}_{1} \frac{1}{x}dx$ is convergent.

e. The sequence $\left\{\frac{\sin n}{n}\right\}_{n\;1}$ is divergent

4. The area of the region bounded by $y \quad \ln x$, $x \quad axis$, and $x \quad e$ is :

Notation **a**. e

b. $\frac{1}{2}$

c. $ln\; e \quad 1$

d. $e \quad 1$

e. 1

5. $\displaystyle {}_{\frac{}{6}}^{\frac{}{3}} \frac{1}{x^2 \sin\frac{1}{x}}\; dx$

a. $2 \quad \frac{2}{\sqrt{3}}$

b. $\frac{1}{2} \quad \frac{2}{\sqrt{3}}$

c. $\frac{\sqrt{3}}{2} \quad \ln 2$

d. $\ln\sqrt{3} \quad 2$

e. $\ln\sqrt{3} \quad \ln\; 2 \quad \sqrt{3}$

6. $\displaystyle {}_{0}^{2} \frac{dx}{x \quad 1^{\;2}}$

- **a.** 2
- **b.** $\frac{1}{2}$
- **c.** Divergent
- **d.** $\ \ 1$
- **e.** $\ \ 2$

7. $_{0}^{\overline{\ 3}} \tan^3 x \sec^4 x \, dx$

- **a.** $\frac{9}{2}$
- **b.** $\frac{9\sqrt{3}}{2}$
- **c.** $\frac{27}{2}$
- **d.** $\frac{27}{4}$
- **e.** $\frac{9}{4}$

8. $\frac{d}{dx} {}_{\sqrt{x}}^{\frac{1}{x}} \frac{\tan t}{t^2 \quad 1} dt$

- **a.** $\ln \frac{1}{x} \quad \ln \sqrt{x}$
- **b.** $\frac{\tan \frac{1}{x}}{1 \quad x^2} \quad \frac{\tan \sqrt{x}}{2x\sqrt{x} \quad 2\sqrt{x}}$
- **c.** $\frac{1}{1 \quad x^{2} \ {}^{2}}$
- **d.** $\tan^{1} \frac{1}{x} \quad \tan^{1} \sqrt{x}$
- **e.** $\frac{\tan^2 \frac{1}{x}}{2} \quad \frac{\tan^2 \sqrt{x}}{2}$

9. The radius of convergence of the power series $_{n\ 1} \frac{x \quad 1\ ^{n} n^2}{10^n}$ is equal to:

- **a.** 5
- **b.** 10
- **c.** $\sqrt{10}$
- **d.** 1
- **e.** 2

10. $_{0}^{1} \sin^{1} x \, dx$

- **a.** $\frac{\ }{2}$
- **b.** $\frac{\ }{2} \quad 1$
- **c.** $\frac{\ }{4}$
- **d.** $\frac{\ }{4} \quad 1$
- **e.** 1

11. $_{\frac{\ }{2}}^{0} \frac{\cos}{\sin^2 \quad 2\sin \quad 2} d$

- **a.** $\ln 5 \quad 1$
- **b.** $\ln 5 \quad \ln 2$
- **c.** $\frac{\ }{4}$

d. $\frac{}{2}$

e. 1

12. $\int_0^{\ln 2} \frac{dx}{\sqrt{e^{2x} \quad 1}}$

a. $\frac{\sqrt{e^4 \quad 1}}{2}$

b. $\frac{}{4}$

c. 1

d. $2\sqrt{e^4 \quad 1}$

e. $\frac{}{3}$

13. Let the series $\sum_{k \; 1} \left[\frac{1}{2k \quad 1} \quad \frac{1}{2k \quad 1}\right]$ then the n th partial sum of the series S_n is equal to:

a. $S_n \quad \frac{2}{3} \quad \frac{1}{2n \quad 1}$

b. $S_n \quad \frac{3}{4} \quad \frac{1}{2n \quad 1}$

c. $S_n \quad 1 \quad \frac{1}{2n \quad 1}$

d. $S_n \quad \frac{3}{2} \quad \frac{1}{2n \quad 1}$

e. $S_n \quad \frac{1}{2} \quad \frac{1}{2n \quad 1}$

14. If the parametric curve $x \quad \cos^2 t$, $y \quad \sin^2 t$, $0 \quad t \quad \frac{}{2}$, is revolving about the $x \quad axis$, then the surface area is equal to :

a. $\frac{}{2}$

b. $\frac{}{\sqrt{2}}$

c.

d. $\sqrt{2}$

e. 2

Solving Part (Show all of your work)

15. Find the interval of convergence of the power series $\sum_{n \; 1} \frac{2^n x^n}{n}$

16. $\int \frac{1}{\sqrt[3]{x} \quad \sqrt{x}} dx$

17. $\int_0^{\ln 2} \frac{\tanh x}{1 \quad \sinh^2 x} dx$

18. Find the volume of revolution if the region between the curve $y \quad \cos x$, and $x \quad axis$ from $x \quad 0$ to $x \quad \frac{}{2}$ is revolving about the $x \quad axis$

19. Determine if the series $\sum_{n \; 0} \frac{3^n \quad 2^n}{7 \; 5^{\; n}}$ is convergent or divergent , give the sum if convergent.

20. Use the fact that $\frac{1}{1 \quad x} \quad \sum_{k \; 0} x^k$, for $|x| \quad 1$, find the power series representation of $\tan^{\;1} 2x$, $|x| \quad \frac{1}{2}$

21. Detrmine if the sequence $\left\{\frac{n!}{n^n}\right\}_{n \; 1}$ is convergent or divergent

Math 102 Sem II (052) Second Major Exam Wed 26 / 4 / 2006 Time $1\frac{1}{4}$ hours

Answer all the questions
Show all of your work

Question #	1	2	3	4	5	6	7	8	Total
Grade	/5	/5	/5	/5	/5	/5	/5	/5	/40

1. Find the arclength of the parametric curve $y \quad e^{t}\sin t$, $x \quad e^{t}\cos t$ from $t \quad 0$ to $t \quad 1$

2. $x \tan\ ^{1}x\, dx$ 8. $\frac{x^2}{\sqrt{4x \quad x^2}}dx$

3. Find the surface area generated if the curve $y \quad \cosh x$, $0 \quad x \quad 2$ is revolving about the $y \quad axis$.

4. $\frac{2 \quad 2}{x\ x \quad 1\ ^{2}}dx$ 6. $_{0}\ \frac{e^{x}}{\sqrt{e^{2x} \quad 1}}dx$ 7. $\tan^{\frac{3}{2}}x \sec^{4}x\, dx$

5. Determine if the sequence $\frac{3 \quad 2n}{3n}\ ^{n}\ _{n\ 1}$ is convergent or divergent , if convergent find the limit.

Math 102 Sem II (052) First Major Exam Wed 22 / 3 / 2006 Time $1\frac{1}{4}$ hours

Question #	1a	1b	1c	2	3	4	5	6	7	Total
Grade	/4	/4	/4	/4	/5	/5	/5	/4	/5	/40

1. Integrate each of the following:

a. $^{4}_{1}\ \frac{x^3 \quad 3x \quad 2}{\sqrt{x}}\ dx$ *b.* $\frac{\cos 2x}{\sqrt{4 \quad 3\sin 2x}}dx$ *c.* $x \quad 1\ ^{23}x^2\ dx$

2. Find the derivative $\frac{d}{dx}\ ^{x^2}_{\tan x}\ \frac{t \quad 3}{t^2 \quad 1}dt$

3. Find the area of the region bounded by $y \quad x^2$, $y \quad 4x \quad 4$, and $y \quad 0$

4. Find the volume generated if the region bounded by the curves $y \quad x^3$, $x \quad 1$, $y \quad 0$ is revolving about the $x \quad axis$

5. Express the Riemann Sum $\lim_{n}\ \sum^{n}_{k\ 1} \frac{n}{n^2 \quad k^2}$ over the interval $0, 1$ as a definite integral and solve it

6. Find the volume generated if the region bounded by the curves $y \quad x^2$, $y \quad x \quad 2$, is revolving about the line $x \quad 1$

7. $^{\ln 2}_{0}\ \frac{1}{1 \quad e^{\ x}}dx$