King Fahd University of Petroleum & Minerals
Department of Mathematical Sciences
Math102 – Final Exam

Time: 7:00 - 9:30 pm **Date: August 15, 2006**

VERSION I

YOU MUST SHOW ALL THE WORK IN ORDER TO GET A FULL CREDIT

CALCULATORS ARE NOT ALLOWED IN THE EXAM

Student's Name:..... **ID #:**..... **Section:** .....

Question	Choice				
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	(true)	(false)			
15	(true)	(false)			
16	(true)	(false)			
17	(a)	(b)	(c)	(d)	(e)
18	(a)	(b)	(c)	(d)	(e)
19	(a)	(b)	(c)	(d)	(e)
20	(a)	(b)	(c)	(d)	(e)

1) The area of the solid enclosed by $y = x$ & $y^2 - 4y = x$ is:

a) $\frac{25}{6}$ b) $-\frac{125}{6}$ c) $\frac{125}{6}$ d) $-\frac{25}{6}$ e) $\frac{119}{6}$

2) The volume of the solid enclosed by $y = x$ & $4x = y^2$ rotating the solid about $x = 4$ is:

a) $\frac{32\pi}{3}$ b) $-\frac{64\pi}{5}$ c) $\frac{64\pi}{3}$ d) $-\frac{64\pi}{3}$ e) $\frac{64\pi}{5}$

3) The integral $\int_0^3 \left|x^2 - 4\right| dx =$

a) $-\frac{25}{3}$ b) $-\frac{23}{3}$ c) $\frac{25}{3}$ d) $\frac{23}{3}$ e) $\frac{19}{3}$

4) The integral $\int_0^1 \frac{x^2}{\sqrt{1-x}} dx =$

a) $-\frac{16}{15}$ b) $\frac{16}{15}$ c) $\frac{17}{15}$ d) $-\frac{17}{15}$ e) $\frac{14}{15}$

5) The integral $\int_0^2 x^3\sqrt{x^2+4}\,dx =$

a) $\frac{64}{15}(\sqrt{2}+1)$ b) $\frac{64}{15}(\sqrt{2}-1)$ c) $\frac{64}{5}(\sqrt{2}-1)$ d) $\frac{64}{5}(\sqrt{2}+1)$ e) 0

6) The integral $\int_1^2 \frac{\ln x}{x^2}\,dx =$

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

7) The integral $\int_0^{\pi} \sin^4(3t)\, dt =$

a) $-\frac{4\pi}{15}$ b) $-\frac{8\pi}{8}$ c) $\frac{4\pi}{15}$ d) $\frac{3\pi}{8}$ e) $-\frac{3\pi}{8}$

8) The integral $\int_2^3 \frac{x^3+1}{x^3-x^2}\, dx =$

a) $\ln\frac{27}{25}$ b) $\ln\frac{8}{3}+\frac{5}{6}$ c) $\ln\frac{8}{3}+\frac{7}{6}$ d) $\ln\frac{8}{3}-\frac{7}{6}$ e) $\ln\frac{8}{3}-\frac{5}{6}$

9) The integral $\int_0^{\infty} \frac{x}{(x^2+2)^2}\,dx$ converges to:

a) $\frac{1}{4}$ b) $-\frac{1}{4}$ c) $\frac{3}{4}$ d) $-\frac{3}{4}$ e) Diverges

10) The surface area obtained by rotating the surface $y = 1 - x^2$ about the $y-$axis, $0 \le x \le 1$ is:

a) $\frac{\pi}{6}5\sqrt{5}$ b) $\frac{\pi}{6}(5\sqrt{5}+1)$ c) $\frac{\pi}{3}(5\sqrt{5}-1)$ d) $\frac{\pi}{4}(5\sqrt{5}-1)$ e) $\frac{\pi}{6}(5\sqrt{5}-1)$

11) The sequence $\left\{\frac{\ln n}{\ln 2n}\right\}_{n=1}^{+\infty}$ converges to:

a) -1 b) -2 c) 1 d) 2. e) Diverges

12) The series $\sum_{n=1}^{\infty}\frac{2^n+3^n}{6^n}$ is convergent and its sum is equal to :

a) $s=\frac{1}{2}$ b) $s=\frac{3}{2}$ c) $s=\frac{5}{2}$ d) $s=-\frac{3}{2}$ e) Divergence

13) The series $\sum_{n=1}^{\infty} n^2 e^{-n^3}$ converges to:

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

14) Answer with true or false, the series $\sum_{n=1}^{\infty} \frac{n-1}{n^2+n}$ converges only.

15) Answer with true or false, the series $\sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{n \ln n}$ converges only.

16) Answer with true or false, the series $\sum_{n=2}^{\infty} \frac{3^n n^2}{n!}$ converges only.

17) The radius & the interval of convergence of the power series $\sum_{n=0}^{\infty} n^3 (x-5)^n$ is:

a) $R=1, I=[4, 6]$ b) $R=2, I=(4, 6)$ c) $R=4, I=(4, 6)$ d) $R=5, I=(4, 6)$ e) $R=1, I=(4, 6)$

18) The power series representation of the function $f(x)=\dfrac{3}{1-x^4}$ is:

a) $-\sum_{n=0}^{\infty} 3x^{4n}$ b) $\sum_{n=0}^{\infty} x^{4n}$ c) $\sum_{n=0}^{\infty} 3x^{4n}$ d) $\sum_{n=0}^{\infty} 2x^{4n}$ e) $\sum_{n=0}^{\infty} 5x^{4n}$

19) The Maclaurin series of $f(x) = \sin 2x$ is: a) $\sum_{n=0}^{\infty} \frac{(-1)^n 2^{2n} x^{2n+1}}{(2n-1)!}$

b) $\sum_{n=0}^{\infty} \frac{(-1)^n 2^{2n+1} x^{2n+1}}{(2n+1)!}$ b) $\sum_{n=0}^{\infty} \frac{(-1)^n 2x^{2n+1}}{(2n+1)!}$ c) $\sum_{n=0}^{\infty} \frac{(-1)^n 2^{2n+1} x}{(2n+1)!}$ d) $\sum_{n=0}^{\infty} \frac{(-1)^n 2^{2n+1} x^{2n+1}}{(2n+2)!}$

20) The Taylor series of $f(x) = x^3$ centered at $a = -1$ is: a) $-3 + 3(x+1) - 3(x+1)^2 + (x+1)^3$

b) $-2 + 3(x+1) - 3(x+1)^2 + (x+1)^3$ c) $1 - 3(x+1) + 3(x+1)^2 - (x+1)^3$

d) $-1 + 3(x+1) - 3(x+1)^2 + (x+1)^3$ e) $-1 + 5(x+1) - 7(x+1)^2 + 9(x+1)^3$

Bonus