MA 162 **Exam 3** **Spring 2008**

Name_____

10-digit PUID_____

RECITATION Division and Section Numbers_____

Recitation Instructor_____

Instructions:

1. Fill in all the information requested above and on the scantron sheet.
2. This booklet contains 22 problems. Problems 1 - 17 are worth 4 points each, problems 18 - 20 are worth 6 points each and problems 21 and 22 are worth 7 points each. The maximum score is 100 points.
3. For each problem mark your answer on the scantron sheet and also circle it in this booklet.
4. Work only on the pages of this booklet.
5. Books, notes, calculators or any electronic devices are not to be used on this test.

1. If $\lim_{n\to\infty} a_n = 0$, then $\sum_{n=1}^{\infty} a_n$ converges.

   A. True

   B. False

2. If $\sum_{n=1}^{\infty} |a_n|$ converges then $\sum_{n=1}^{\infty} a_n$ converges.

   A. True

   B. False

3. If $\lim_{n\to\infty} \sqrt[n]{|a_n|} = 2$, then $\sum_{n=1}^{\infty} a_n$ converges.

   A. True

   B. False

4. If $\lim_{n\to\infty} \frac{\frac{1}{n}}{a_n} = 2$, then $\sum_{n=1}^{\infty} a_n$ diverges.

   A. True

   B. False

5. If $\lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right| = \frac{1}{2}$, then $\sum_{n=1}^{\infty} a_n$ converges.

   A. True

   B. False

6. If $a_n > b_n \geq 0$ for all n and $\sum_{n=1}^{\infty} a_n$ diverges, then $\sum_{n=1}^{\infty} b_n$ diverges.

   A. True

   B. False

7. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2+n}$ converges absolutely.

A. True

B. False

8. $\sum_{n=1}^{\infty} \frac{\sin(n)}{n^2}$ converges conditionally.

A. True

B. False

9. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ diverges.

A. True

B. False

10. $\sum_{n=1}^{\infty} \left(\frac{5}{4}\right)^{n-1}$ converges.

A. True

B. False

11. $\sum_{n=1}^{\infty} \frac{(-1)^n}{2^n}$ converges absolutely.

A. True

B. False

12. $\sum_{n=1}^{\infty} a_n = \lim_{N\to\infty} \left(\sum_{n=1}^{N} a_n\right)$.

A. True

B. False

13. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n\ln(n)}$ converges.

A. True

B. False

14. $\displaystyle\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$ diverges.

A. True

B. False

15. If $f(x) = 4 + x - x^2 + x^3 - x^4 + \cdots$, then $f'''(0) = 6$.

A. True

B. False

16. If $f(x) = \displaystyle\sum_{n=0}^{\infty} \frac{n}{(n+1)!}\, x^n$, then $f^{(5)}(0) = \frac{1}{6}$.

A. True

B. False

17. The radius of convergence of the series $\displaystyle\sum_{n=0}^{\infty}(2x)^n$ is 2.

A. True

B. False

18. $\displaystyle\sum_{n=1}^{\infty} \frac{(-2)^{n-2}}{3^n} =$

A. $-\frac{3}{5}$
B. $-\frac{1}{5}$
C. $-\frac{2}{5}$
D. $-\frac{6}{5}$
E. $-\frac{1}{10}$

19. The interval of convergence of the power series $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n}{n^2}\,(x+1)^n$ is.

A. $[-2, 0]$
B. $(-2, 0]$
C. $[0, 2]$
D. $(0, 2]$
E. $[0, 2)$

20. If $\dfrac{1}{1+2x} = c_0 + c_1 x + c_2 x^2 + c_3 x^3 + \cdots$ then $c_3 =$

A. $\dfrac{8}{3!}$
B. $-\dfrac{8}{3!}$
C. 8
D. -8
E. 4

21. Using power series, the smallest number of terms needed to approximate $\displaystyle\int_0^{1/10} \frac{1}{1+x^2}\,dx$ to within 10^{-6} is

A. 1

B. 2

C. 3

D. 4

E. 5

22. The first 4 nonzero terms of the power series representation for $f(x) = (1+x)^{-3}$ are

A. $1 - 3x + 6x^2 - 10x^3$

B. $1 - 3x + 12x^2 - 60x^3$

C. $1 - 3x + 6x^2 - 6x^3$

D. $1 - 3x + 3x^2 - x^3$

E. $1 - 3x + 4x^2 - 8x^3$