**MA 162 EXAM #3** **April 4, 2002**

Name _____ Student ID number _____

Lecturer _____ Recitation Instructor _____

Instructions:

1. This package contains 12 problems, each worth 8 points.
2. Please supply all information requested above and on the mark–sense sheet.
3. Work only in the space provided, or on the backside of the pages. Mark your answers clearly.
4. No books, notes, or calculator, please.

1. The series $1 + \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} + \frac{1}{4\sqrt{4}} + \ldots$

A. converges by the Ratio Test,

B. diverges by the Root Test,

C. converges by the Integral Test,

D. diverges by the Integral Test,

E. converges by comparison to $\sum_{n=1}^{\infty} \frac{1}{n^2}$

2. Which of the following series converge?

I. $\sum_{n=1}^{\infty} \cos(n)$

II. $\sum_{n=1}^{\infty} \frac{\sin(n)}{n^{3/2}}$

III. $\sum_{n=1}^{\infty} n^2 e^{-n}$

A. I only

B. II only

C. III only

D. I and II only

E. II and III only

3. The series $\sum_{n=1}^{\infty} (-1)^n \frac{\ln n}{n}$

A. diverges by the Integral Test

B. converges absolutely

C. converges conditionally

D. converges by the Ratio Test

E. diverges because the terms don't converge to 0

4. Let $S = \sum_{n=1}^{\infty} \frac{(-1)^n}{(n+1)^3}$. How many terms do we need to estimate $S$ with an error less than $10^{-2}$.

A. 2

B. 3

C. 4

D. 5

E. 6

5. The series $\sum_{n=1}^{\infty} \frac{(-1)^n 10^n}{n!}$

A. converges absolutely by the Ratio Test

B. converges conditionally

C. diverges by the Ratio Test

D. diverges by the Root Test

E. diverges by the Integral Test

6. The series $\sum_{n=1}^{\infty} \frac{\sqrt{n^3+1}}{2n^3-n}$

A. converges because $\lim_{n\to\infty} a_n = 0$

B. converges by the Comparison Test using $\sum_{n=1}^{\infty} \frac{1}{n^2}$

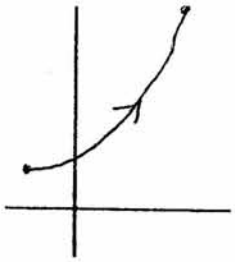
C. converges by the Limit Comparison Test using $\sum_{n=1}^{\infty} \frac{1}{n^{3/2}}$

D. diverges by the Integral Test

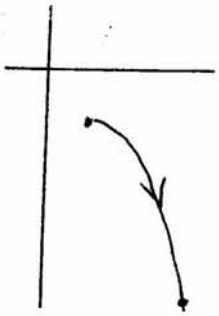
E. diverges because $\lim_{n\to\infty} a_n \neq 0$

7. Which curve is parameterized by $x = 2\sqrt{t} - 1, \quad y = t + 1, \quad 0 \leq t \leq 4$.

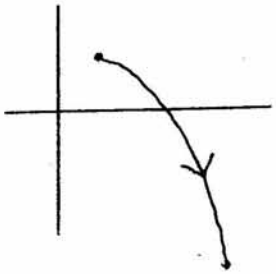
A.



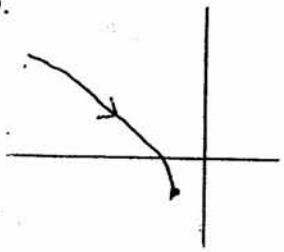
B.



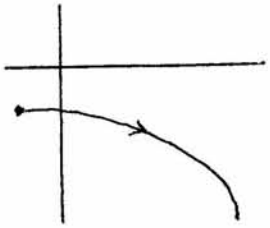
C.



D.



E.



8. Find the set of points at which the series $\sum_{n=1}^{\infty} \frac{3^{n-1}x^n}{2n}$ converges.

A. $-3 < x \leq 3$

B. $-3 \leq x < 3$

C. $-\frac{1}{3} < x < \frac{1}{3}$

D. $-\frac{1}{3} \leq x < \frac{1}{3}$

E. $-\frac{3}{2} < x < \frac{3}{2}$

9. Compute the first three nonzero terms of the power series of $\int \frac{x\,dx}{1+x^3}$.

A. $x - \frac{x^4}{4} + \frac{x^7}{7}$

B. $\frac{x^2}{2} - \frac{x^5}{5} + \frac{x^8}{8}$

C. $\frac{x^2}{2} + \frac{x^5}{5} + \frac{x^8}{8}$

D. $\frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{4}$

E. $\frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4}$

10. Find which series equals the definite integral $\int_0^1 e^{-x^2}\,dx$.

A. $\sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)n!}$

B. $\sum_{n=0}^{\infty} \frac{(-1)^n}{n!}$

C. $\sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!}$

D. $\sum_{n=0}^{\infty} \frac{1}{(2n+1)(n-1)!}$

E. $\sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)(n-1)!}$

11. If the function $\ln x$ is written as a power series of the form $\sum_{n=0}^{\infty} c_n(x-2)^n$, then $c_3 =$

A. $\frac{1}{12}$

B. $\frac{1}{4}$

C. $-\frac{1}{4}$

D. $\frac{1}{24}$

E. $-\frac{1}{12}$

12. Find the first three nonzero terms of the power series of $f(x) = \sqrt{4+x}$

A. $4 + \frac{x}{4} - \frac{x^2}{8}$

B. $2 + \frac{x}{8} - \frac{x^2}{64}$

C. $2 + \frac{x}{4} + \frac{x^2}{128}$

D. $4 + \frac{x}{8} - \frac{x^2}{64}$

E. $2 + \frac{x}{4} - \frac{x^2}{64}$