NAME ____________________

STUDENT ID ____________________

REC. INSTR. ____________ REC. TIME. ____________

INSTRUCTOR ____________________

INSTRUCTIONS:

1. Make sure that you have all 5 test pages.
2. Fill in your name, your student ID number, and your instructor's name above. Write your name, your student ID number and division and section number of your recitation section on your answer sheet, and fill in the corresponding circles.
3. Mark the letter of your response for each question on the mark–sense answer sheet.
4. There are 12 problems, each worth 8 points, for a total of 96 points.
5. No books or notes or calculators may be used.

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \qquad , |x| < \infty$$

$$\sin x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!} \qquad , |x| < \infty$$

$$\cos x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} \qquad , |x| < \infty$$

$$(1+x)^s = \sum_{n=0}^{\infty} \binom{s}{n} x^n, \ |x| < 1$$

$$\ln(1+x) = \sum_{n=1}^{\infty} (-1)^{n+1} \frac{x^n}{n}, \ |x| < 1$$

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1. Which of the following are true?

   I. If a series is convergent then it is absolutely convergent.

   II. If a series is convergent then it is conditionally convergent.

   III. If a series is absolutely convergent then it is convergent.

   A. only I

   B. only II

   C. only III

   D. only II and III

   E. All are true

2. For the series

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

   (2) $\displaystyle\sum_{n=1}^{\infty} \frac{\sin(n)}{n^2}$

   A. (1) converges (2) diverges

   B. (1) diverges (2) converges

   C. (1) converges conditionally (2) converges

   D. Both (1) and (2) converge absolutely

   E. (1) converges absolutely (2) converges conditionally

3. The radius of convergence of $\sum_{n=0}^{\infty}(3-2^{-n})x^n$ is

   A. 1

   B. 3

   C. $\frac{1}{3}$

   D. 2

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

4. The interval of convergence of the series

$$\sum_{n=1}^{\infty} \frac{x^n}{\sqrt{n}} \text{ is}$$

A. $(-\sqrt{n}, \sqrt{n})$

B. $[-1, 1)$

C. $(-1, 1)$

D. $(-1, 0)$

E. $(-\infty, \infty)$

5. $\displaystyle\sum_{n=0}^{\infty} \frac{x^{3n}}{n!} =$

A. $\frac{1}{3}e^x$

B. $e^{\frac{x}{3}}$

C. e^{3x}

D. $3e^x$

E. $e^{(x^3)}$

6. The first nonzero term in the Taylor series of $\ln\left(\dfrac{1+e^x}{2}\right)$ about 0 is

A. $\dfrac{1+e^x}{2}$

B. 1

C. $\dfrac{x^2}{2}$

D. $\dfrac{x}{2}$

E. 0

7. The Taylor series of $\sqrt{1+2x}$ about 0 is

A. $1+x-\dfrac{x^2}{2}+\dots$

B. $1+\dfrac{x^2}{2}+\dots$

C. $1+2x+4x^2+\dots$

D. $2x+\dfrac{x^2}{2}+\dots$

E. $2+\dfrac{x}{2}+\dfrac{x^2}{4}+\dots$

8. The given semicircle has parametric equations:

A. $x = t, y = \sqrt{1-t^2}, \quad -1 \leq t \leq 0$

B. $x = t, y = -\sqrt{1-t^2}, \quad -1 \leq t \leq 0$

C. $x = \sqrt{1-t^2}, y = t, \quad -1 \leq t \leq 1$

D. $x = -\sqrt{1-t^2}, y = t, \quad -1 \leq t \leq 1$

E. $x = -t, y = -\sqrt{1-t^2}, \quad 0 \leq t \leq 1$

9. Find the length of the curve described parametrically by

$x = 3 + 2t^2$

$y = 2 - \frac{1}{3}t^3, \ 0 \leq t \leq 3$

A. $\frac{125}{3}$

B. $\frac{61}{3}$

C. $\frac{125}{2}$

D. $\frac{61}{2}$

E. $\frac{64}{3}$

10. Find a set of polar coordinates for the point whose Cartesian coordinates are $(-2, -2\sqrt{3})$.

A. $(2, \frac{4\pi}{3})$

B. $(4, \frac{\pi}{3})$

C. $(4, \frac{7\pi}{6})$

D. $(-4, \frac{4\pi}{3})$

E. $(4, \frac{4\pi}{3})$

11. Convert $x^2 + y^2 - 3y = 0$ to a polar equation.

A. $r = 3\sin\theta$

B. $r = 3\cos\theta$

C. $r = 3$

D. $r^2 = 3\sin\theta$

E. $r^2 = 3\cos\theta$

12. The graph of the polar equation $r = 1 - \sin\theta$ is given by

A.

B.

C.

D

E.