

NAME _____

10-DIGIT PUID _____

RECITATION INSTRUCTOR _____

RECITATION TIME _____

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TOTAL	/100

DIRECTIONS

- Write your name, 10-digit PUID, recitation instructor's name and recitation time in the space provided above. Also write your name at the top of pages 2, 3, and 4.
- The test has four (4) pages, including this one.
- Write your answers in the boxes provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses in the left hand margin.
- No books, notes or calculators may be used on this test.

- (9) 1. Determine whether the following statements are true or false for any series $\sum_{n=1}^{\infty} a_n$.
 (Circle T or F. You do not need to show work).
- (a) If $\lim_{n \rightarrow \infty} a_n$ does not exist, then $\sum_{n=1}^{\infty} a_n$ is divergent. T F
- (b) If $0 \leq a_n \leq \frac{1}{n\sqrt{n}}$ for all n , then $\sum_{n=1}^{\infty} a_n$ is convergent. T F
- (c) If $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = 1$, then $\sum_{n=1}^{\infty} a_n$ is convergent. T F

- (12) 2. Determine whether each of the following series is convergent or divergent. (You do not need to show work).

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

(b) $\sum_{n=1}^{\infty} \frac{5(-2)^{n+1}}{3^n}$

(c) $\sum_{n=1}^{\infty} \frac{5-2\sqrt{n}}{n^3}$

- (27) 3. Determine whether each series is convergent or divergent. You must verify that the conditions of the test are satisfied and write your conclusion in the small box.

(a)
$$\sum_{n=1}^{\infty} (-1)^{n-1} n e^{-\frac{n}{3}}$$

Show all necessary work here:

By the

test, the series is

(b)
$$\sum_{n=1}^{\infty} \frac{\sqrt{n^2 + 5}}{n^3 + 1}$$

Show all necessary work here:

By the

test, the series is

(c) $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

Show all necessary work here:

By the _____ test, the series is _____

(10) 4. Determine whether the series $\sum_{n=1}^{\infty} \frac{\cos(\frac{n}{2})}{n^2 + 4n}$ is absolutely convergent, conditionally convergent or divergent.

(9) 5. Consider the series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{4^n}$.

(a) Write out the first five terms of the series.

(b) Find the smallest number of terms that we need to add in order to estimate the sum of the series with error < 0.01 .

(16) 6. For the power series $\sum_{n=1}^{\infty} \frac{(-2)^n x^n}{\sqrt[4]{n}}$, find the following, showing all work.

(a) The radius of convergence R .

$R =$

(b) The interval of convergence. (Don't forget to check the end points).

Interval of convergence

(10) 7. Find the power series representation of $\frac{x}{1-2x}$ (about $a = 0$) and give its interval of convergence

$\frac{x}{1-2x} = \sum$

Interval of convergence

(7) 8. Find the Taylor series for $f(x) = e^x$ centered at $a = 3$.

$e^x = \sum$
