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STUDENT ID	Page 2	/20
RECITATION INSTRUCTOR	Page 3	/30
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DIRECTIONS

- 1. Write your name, student ID number, 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.
- 2. The test has four (4) pages, including this one.
- 3. Write your answers in the boxes provided.
- 4. You must show sufficient work to justify all answers. Correct answers with inconsistent work may not be given credit.
- 5. Credit for each problem is given in parentheses in the left hand margin.
- 6. No books, notes or calculators may be used on this test.
- (14) 1. Circle the letter of the correct response. (You need not show work for this problem).
 - (a) Which of the following statements are true for any series $\sum_{n=1}^{\infty} a_n$ with positive terms?
 - (I) If $\lim_{n\to\infty} a_n = 0$, then $\sum_{n=1}^{\infty} a_n$ converges.
 - (II) If $\lim_{n\to\infty} \frac{a_n}{\left(\frac{1}{n}\right)} = 1$, then $\sum_{n=1}^{\infty} a_n$ diverges.
 - (III) If $\lim_{n\to\infty} \frac{a_{n+1}}{a_n} = \frac{1}{2}$, then $\sum_{n=1}^{\infty} a_n$ converges.
 - A. II only B. II and III only C. I and III only D. all E. (I) none
 - (b) Which of the following series converge?
 - (I) $\sum_{n=1}^{\infty} \frac{2^n}{n!}$
 - (II) $\sum_{n=1}^{\infty} \frac{n^3-1}{n^4-n}$
 - (III) $1 \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} \frac{1}{4\sqrt{4}} + \dots$
 - A. I only B. III only C. II and III only D. I and III only E. none

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(20) 2. Determine whether each series is convergent or divergent. You must show all necessary work and write your conclusion in the small box.

(a)
$$\sum_{n=1}^{\infty} \frac{n}{\sqrt{n^5 + 4}}$$

Show all necessary work here:

By the

test, the series is

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

Show all necessary work here:

By the

test, the series is

gent, find its sum.

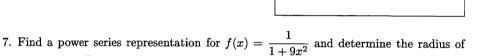


- 4. Consider the series $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{1}{n^3}$.
 - (a) Write out the first six terms of the series.
 - (b) Find the smallest number of terms that we need to add in order to estimate the sum of the series with error < 0.01.

terms

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

(16) 6. Find the interval of convergence of the power series $\sum_{n=1}^{\infty} \frac{n \, x^n}{2^n}$. Don't forget to test for convergence at the end points of the interval. You must show all work.



$$\frac{1}{1+9x^2} = \sum_{}$$

$$R =$$

(10) 8. Find the Taylor series for $f(x) = 1 + x + x^2$ centered at a = 2.

(10)

convergence R.

f(x) =