

Exam 3 Review-1

Name: _____

November 21, 2014

Directions: Work in groups to complete the following problems.

1. State the limit comparison test. Make sure to state all of the hypotheses and the conclusion.

2. (a) $\sum_{n=1}^{\infty} \left(\frac{1}{n+2} - \frac{1}{n+3} \right) =$

(c) $\lim_{n \rightarrow \infty} \sum_{k=0}^n \left(\frac{1}{5} \right)^k =$

(b) $\sum_{n=0}^{\infty} \left(\frac{-2}{5} \right)^{n-1} =$

(d) Give a power series for $\sin(x)$

(e) Give a power series for e^{-x}

(f) Give a power series for $\frac{d}{dx} \left(\frac{1}{1-x} \right)$

3. Are the following series conditionally convergent, absolutely convergent or divergent? Justify your answer

(a) $\sum_{n=1}^{\infty} \frac{n^2}{100n^2 - 1}$

(c) $\sum_{n=1}^{\infty} \frac{100n - 1}{n^3}$

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

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

4. Find the radius of convergence of the power series $\sum_{n=1}^{\infty} \frac{2^n x^n}{n^2}$.

5. The power series $\sum_{n=1}^{\infty} (-1)^n \frac{(x-2)^n}{n}$ has radius of convergence 1. You do not need to check.

(a) What is the center of the power series?

(b) What are the endpoints of the interval of convergence?

(c) Does the series converge at the left endpoint? the right endpoint?

6. (a) Find a power series for $\cos(x^2)$, using sigma notation.

(b) Find a series for the value $\int_0^1 \cos(x^2) dx$, using sigma notation.

(c) Write out the first 3 nonzero terms of your series from part (b). Do not simplify.

(d) How close is your answer in part (c) to the value of the integral? (i.e. What bound can you put on the error?)

7. Using Taylor's (or Maclaurin's) formula for the coefficients, find the first 3 terms in the power series expansion of $f(x) = \ln(3+x)$ centered at the origin. Then use Taylor's inequality to estimate $R_2(x)$ for $|x+3| \leq 1$