

MA 2733

Examination 3 – November 20, 2013

Name _____

5 T/F, several long answer. 50 points.

General Instructions: Please answer the following, without use of calculators.

You may refer to a 3x5 card, but no other notes. Correct answers without correct supporting work may not receive full credit (excluding the True/False section).

You may use the back of each page for additional answer space (please clearly indicate if you have done so), or scratch work.

Mississippi State University Honor Code: “As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.”

Signature _____

1. True/False. Enter T or F in each blank. A correct answer is worth 2 points, a blank space is worth 0 points, and a wrong answer is worth -2 points. (Your total on this problem will be rounded up to zero if necessary.)

(a) _____ A series which converges conditionally also converges.

(b) _____ If $\sum_{n=0}^{\infty} a_n$ converges, then $\lim_{n \rightarrow \infty} |a_n| = 0$.

(c) _____ If $\sum_{n=0}^{\infty} f(n)$ converges, then $\int_0^{\infty} f(x) dx$ converges.

(d) _____ In $f(x) = \sum_{k=0}^{\infty} x^{2k}$ (considered as a power series), the coefficient of x^3 does not exist.

(e) _____ In the power series $f(x) = \sum_{k=0}^{\infty} k \cdot x^{2k}$, the coefficient of x^5 is 5.

2. Discuss convergence of the following series: determine whether each is absolutely convergent, conditionally convergent, or divergent.

(a) (6 points) $\sum_{n=0}^{\infty} \frac{1}{n - \pi}$

(b) (6 points) $\sum_{n=0}^{\infty} \frac{n^2 + 3n - 5}{n!}$

(c) (6 points) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n^2 + \pi}$

(d) (8 points) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n + \pi}$.

3. (6 points) Discuss the convergence of $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$.
Hint: the Integral Test may be helpful.

4. (8 points) The “explain” problem.

(a) Explain how to rearrange the terms of $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$ to obtain a series converging to 0.

(b) Explain why the same argument cannot be applied to $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^2}$. (Where does your argument from (a) fail with the latter series?)