**NAME:**_____

MATH 152 Dr. Z. , **Post-Exam Practice for Exam II; Practice 1**,
(For people who scored less than 70 in Exam II and still wish to be eligible for the "deal")

**1**. (10 points [5 each]) For each of the two series below, determine whether they converge or diverge .

$$(a)\ \sum_{n=1}^{\infty}(-3)^n \quad , \quad (b)\ \sum_{n=1}^{\infty}\frac{n^5}{5n^8+6n^4+8} \quad ,$$

**2.** (10 points, 5 each) Determine whether the following series converge or diverge. Explain what test(s) you are using.

$$(a) \quad \sum_{n=1}^{\infty} \frac{7 + 14\sqrt{n}}{n^3} \quad ,$$

$$(b) \quad \sum_{n=1}^{\infty} \frac{7 + 4n^3}{n^{7/2} + n^2 + 1} \quad .$$

**3.** Use an improper integral to find an integer $N$, so that the partial sum

$$S_N = \sum_{n=1}^{N} \frac{1}{n^2}$$

is within $10^{-5}$ of the sum of the whole infinite series $\sum_{n=1}^{\infty} \frac{1}{n^2}$. Be sure to explain why the value of N you give is the correct answer. Do not evaluate $S_N$.

**4.** (10 points, 3,3,4, resp.) Determine whether the following series converge or diverge (a) $\sum_{n=1}^{\infty} \frac{9+11n^{13}}{(n^3+1)^5}$, (b) $\sum_{n=1}^{\infty} \frac{3+8^n}{5+9^n}$, (c) $\sum_{n=1}^{\infty} \frac{n^7+6n+9}{\sqrt{n^{16}+11n^4+9}}$ .

**5.** (10 points, 3,3,4, resp.) Determine whether the following series converge absolutely, converge conditionally or diverge

$$(a)\sum_{n=1}^{\infty}\frac{(-1)^n}{n^7+1} \quad , \quad (b)\sum_{n=1}^{\infty}\frac{(-1)^n\sqrt{n+9}}{1+3\sqrt{n+11}} \quad , \quad (c)\sum_{n=2}^{\infty}\frac{(-1)^n}{n\sqrt{\ln n}} \quad .$$

**6.** (10 points, 5 each) Determine whether the following series are absolutely convergent, conditionally convergent or divergent.

$$(a) \sum_{n=1}^{\infty} \frac{(-1)^n n!}{n^n} \quad .$$

$$(b) \sum_{n=1}^{\infty} \frac{n^n}{6^n n!} \quad .$$

**7.** (10 points) Find the radius of convergence and interval of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{(x+3)^n}{n^2 9^n} \quad .$$

**8.** (10 points) Find a power series representation for the function and determine the interval of convergence.

$$f(x) = \frac{x^5}{4 + x^2} \quad .$$

**9** (10 points) Find the Maclaurin series for $f(x) = \ln(1 + x)$ using the **definition** of a Maclaurin series. (No credit for other methods!)

**10.** (10 points) Find the first three non-zero terms of the Maclaurin expansion of

$$f(x) = \frac{e^{3x}}{1+2x}$$