

Practice Exam 3

Name:\_\_\_\_\_

Make sure to neatly and clearly show all work and mark your answers.

1. Find if the following sequence converges. If it does, provide the limit.

$$a_n = \frac{2^n - 2n^4 + \ln(n)}{2n - 3 + n!}$$

2. Determine if the following series converges or diverges. If it converges, find what the sum is.

$$\sum_{k=1}^{\infty} \frac{2^{k+2}}{3^k}$$

3. Determine if the following series converges or diverges. If it converges, find what the sum is.

$$\sum_{k=1}^{\infty} \frac{3}{3k-2} - \frac{3}{3k+1}$$

4. Determine if the series converges or diverges.

$$\sum \frac{2k^2 + 1}{\sqrt{k^3 + 2}}$$

5. Determine if the series converges or diverges.

$$\sum \left( \frac{k}{2k+3} \right)^{2k}$$

6. Determine if the series converges absolutely, conditionally, or diverges.

$$\sum \frac{(-1)^k}{k \ln(k)}$$

7. Let  $f(x) = x^{-1}$ .

1. Find the Taylor Series for  $f(x)$  centered at  $x = 1$ .
2. Determine the interval and radius of convergence of the Taylor Series.
3. Use the Taylor polynomial of degree 2 to approximate  $\frac{1}{1.1}$ .