Name:

Math 116 Exam 3

April 12, 2018

Directions:

1. WRITE YOUR NAME ON THIS TEST!
2. Except where indicated, merely finding the answer to a problem is not enough to receive full credit; you must show how you arrived at that answer.
3. Unless otherwise indicated, decimal approximations for a numerical answer accurate to 4 decimal places are acceptable.
4. If you have a question, raise your hand or come up and ask me.

1) a) (6 points) What are the rectangular (Cartesian) coordinates of the polar point $\left(-2, \frac{17\pi}{6}\right)$?

b) (8 points) What is a representation in polar coordinates of the rectangular point $(-12, -12\sqrt{3})$?

2) Suppose you have a power series whose center is $c = 11$ and whose radius of convergence is $R = 3$.

a) (6 points) Find six numbers for which the power series definitely converges.

b) (3 points) Find three numbers for which the power series definitely diverges.

c) (2 points) Find the only two numbers for which you can't tell whether the series converges or diverges.

3) Consider the power series $\displaystyle\sum_{n=1}^{\infty} \frac{(4x-44)^n}{12^n \cos(1/n)}$.

a) (2 points) What is the center of this series?

b) (20 points) Find the radius of convergence of this series.

4) a) (6 points) Define what it means for $\sum_{n=1}^{\infty} a_n$ to converge to a real number.

b) (14 points) Using the definition of convergence for a series, find the sum of $\sum_{n=1}^{\infty}(\sqrt[4]{n+1} - \sqrt[4]{n})$ or show the series diverges.

5) a) (4 points) Provide all numbers for which $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$.

b) (14 points) Determine whether the series $\sum_{n=1}^{\infty} \frac{3^{3n+1}}{(-2)^{5n}}$ converges or diverges. If it converges, find the sum.

6) (15 points) Determine $\lim_{n\to\infty} a_n$ where

$$a_n = \left(\frac{\ln(2n)}{\ln(n)}\right)^{\ln(n)}.$$