SAMPLE MIDTERM
MATH 121A

This is a 2 hour exam. Your midterm will be shorter.

1. Find the Maclaurin series for the function

\[ f(x) = \frac{x}{1 + x^2 + x^4} \]

2. Find the circle of convergence for the complex power series

\[ \sum_{n=0}^{\infty} \frac{(z - i)^n}{n(1 + i)^n} \]

3. Determine if the following series is convergent

\[ \sum_{n=1}^{\infty} \frac{(1 + i)^n}{n(2 + i)^n} \]

4. Find all the values for

(a) \((-1)^\frac{1}{4}\);
(b) \(\ln(1 + i)\).

5. Find all complex \(z\) such that

\[ \cos i z = \cosh z. \]

6. Let

\[ x^2 + y^2 = u \]
\[ xy = v \]

Find \(\frac{\partial x}{\partial u}\) and \(\frac{\partial x}{\partial v}\).

7. Let

\[ f(x) = \sum_{n=1}^{\infty} \frac{x^n}{n^2} \]

Evaluate \(f(-0.1)\) with an error less than 0.001.