

Math 253 Lesson 14 - Comparison Tests

1. Use the direct comparison test to determine whether the following series converge or diverge.

a. $\sum_{n=0}^{\infty} \frac{n}{n^3 + 1}$

c. $\sum_{n=0}^{\infty} \frac{-3}{2^n + 5}$

b. $\sum_{n=2}^{\infty} \frac{n^2 + 1}{n^3 - 1}$

d. $\sum_{n=1}^{\infty} \frac{\sin(n)}{n^3}$

2. Use the limit comparison test to determine whether the following series converge or diverge.

a. $\sum_{n=1}^{\infty} \frac{3}{2^n - 1}$

b. $\sum_{n=0}^{\infty} \frac{n^2 - 2n - 3}{n^3 + n + 5}$

3. Use a known power series to determine the power series for $f(x) = 3 \ln(1 + x^2)$ and then determine its interval of convergence.

4. Build up the Taylor Series for the function $f(x) = \ln(x^2)$ around $x = 1$ and then find its interval of convergence.