

MA 114 Worksheet #11: Comparison and Limit Comparison Tests

1. (a) Explain the test for divergence. Why should you never use this test to prove that a series converges?
 - (b) State the comparison test for series. Explain the idea behind this test.
 - (c) Suppose that the sequences $\{x_n\}$ and $\{y_n\}$ satisfy $0 \leq x_n \leq y_n$ for all n and that $\sum_{n=1}^{\infty} y_n$ is convergent. What can you conclude? What can you conclude if instead $\sum_{n=1}^{\infty} y_n$ diverges?
 - (d) State the limit comparison test. Explain how you apply this test.
2. Use the appropriate test — Divergence Test, Comparison Test or Limit Comparison Test — to determine whether the infinite series is convergent or divergent.

(a) $\sum_{n=1}^{\infty} \frac{1}{n^{3/2} + 1}$

(h) $\sum_{n=0}^{\infty} \frac{n+1}{n^2 \sqrt{n}}$

(b) $\sum_{n=1}^{\infty} \frac{2}{\sqrt{n^2 + 2}}$

(i) $\sum_{n=0}^{\infty} \frac{2}{\sqrt{n^2 + 2}}$

(c) $\sum_{n=1}^{\infty} \frac{2^n}{2 + 5^n}$

(j) $\sum_{n=0}^{\infty} \frac{n^2 + n + 1}{3n^2 + 14n + 7}$

(d) $\sum_{n=0}^{\infty} \frac{4^n + 2}{3^n + 1}$

(k) $\sum_{n=0}^{\infty} \frac{1 + 2^n}{2 + 5^n}$

(e) $\sum_{n=0}^{\infty} \frac{n!}{n^4}$

(l) $\sum_{n=0}^{\infty} \frac{2}{n^2 + 5n + 2}$

(f) $\sum_{n=0}^{\infty} \frac{n^2}{(n+1)!}$

(m) $\sum_{n=0}^{\infty} \frac{e^{1/n}}{n}$

(g) $\sum_{n=0}^{\infty} \left(\frac{10}{n}\right)^{10}$

(n) $\sum_{n=0}^{\infty} \frac{n}{n^2 - \cos^2 n}$