

Math 112 Worksheet 4: Series Convergence Testing I

Instructions: Determine whether the following series converge or diverge.

1. $\sum_{n=1}^{\infty} \frac{n^3}{n^4 - 1}$

7. $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{2n^{3/2} + 3}$

2. $\sum_{n=1}^{\infty} \frac{\ln n}{n^5}$

8. $\sum_{n=1}^{\infty} \frac{\sin^2 n}{1 + 2^n}$

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

9. $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n - 1}$

4. $\sum_{n=1}^{\infty} \cos(1/n^2)$

10. $\sum_{n=1}^{\infty} \frac{\sqrt{n^4 + 1}}{n^3 + n^2}$

5. $\sum_{n=1}^{\infty} \frac{n + 4^n}{n^2 + 6^n}$

11. $\sum_{n=1}^{\infty} \frac{n^2 - 5n}{n^3 + n + 1}$

6. $\sum_{n=1}^{\infty} \frac{e^{1/n}}{n}$

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

Challenge Problems:

1. $\sum_{n=1}^{\infty} \frac{1}{n^{1+1/n}}$

2. $\sum_{n=1}^{\infty} \sin(1/n)$

3. $\sum_{n=1}^{\infty} \left(\frac{\pi - \arctan n}{2} \right)^n$ (Only use methods we have discussed)

Solutions:

1. Diverges
2. Converges
3. Converges
4. Diverges
5. Converges
6. Diverges
7. Diverges
8. Converges
9. Diverges
10. Diverges
11. Diverges
12. Converges

Solutions to challenge problems:

1. Diverges
2. Diverges
3. Converges