

Convergence of Series III - Answer Key

1. Is $\sum_{n=1}^{\infty} \frac{\ln(x)}{x^3}$ convergent? Why?

Yes, by the integral test $\int_1^{\infty} \frac{\ln(x)}{x^3} dx$ converges.

2. Is $\sum_{n=0}^{\infty} \frac{(-1)^n \sin(n)}{n^2}$ convergent? Why?

Yes, by the comparison test.

3. Is $\sum_{n=0}^{\infty} \frac{(-1)^n n^3}{n^3 + n^2 + 3}$ convergent? Why?

No, the first condition of AST is not satisfied.

4. Is $\sum_{n=1}^{\infty} \frac{\sqrt{2n^2 + 1}}{(n^2 + 1)^2}$ convergent? Why?

Yes, by the comparison test.

5. Is $\sum_{n=1}^{\infty} \frac{(-1)^{n+3} \sqrt{n+2}}{n+4}$ convergent? Why?

Yes, by AST.

6. Is $\sum_{n=1}^{\infty} \frac{\ln(n) + 1}{\sqrt{n}}$ convergent? Why?

No, by the integral test.

7. Is $\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n+5}}$ convergent? Why?

No, by the integral test.

8. Is $\sum_{n=0}^{\infty} \frac{(-1)^n}{n \ln(n)}$ convergent? Why?

Yes, by AST.

9. Is $\sum_{n=0}^{\infty} \frac{n + \sqrt{n}}{n}$ convergent? Why?

No, by the divergent test.

10. Is $\sum_{n=0}^{\infty} \frac{(-1)^n n!}{(n+3)!}$ convergent? Why?

No, the first condition of AST is not satisfied.