

## 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.