Math 102 — Integral test

Problem 1. Use the integral test to determine the convergence or divergence of the following series.

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

b. $\sum_{n=1}^{\infty} e^{-n}$

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

d. $\sum_{n=1} \frac{\ln n}{n}$

Problem 2. True or false: $\sum_{n=1}^{\infty} \frac{1}{n^3}$ and $\int_1^{\infty} \frac{1}{x^3}\,dx$ both converge to $1/2$.

Problem 3. Explain why the integral test cannot be applied to the following series.

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

b. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}$

c. $\sum_{n=1}^{\infty} e^{-n} \sin n$