

Section 10.3: The Integral Test - Worksheet

1. For each sequence $\{a_n\}_{n=n_0}^{\infty}$ given below, determine

- (i) whether the **sequence** $\{a_n\}_{n=n_0}^{\infty}$ converges or diverges. If the sequence converges, find its limit.
(ii) whether the **series** $\sum_{n=n_0}^{\infty} a_n$ converges or diverges. If the series converges, find its sum if possible.

Note: the integral test is not possible/necessary for all the series.

- (a) $\{n5^{-n}\}_{n=0}^{\infty}$ (d) $\{\cos(n^{1/n})\}_{n=1}^{\infty}$ (g) $\{2^{2n+1}5^{-n}\}_{n=0}^{\infty}$
(b) $\left\{\frac{1}{n(1+\ln(n)^2)}\right\}_{n=2}^{\infty}$ (e) $\left\{\frac{1}{(n^2+9)^{3/2}}\right\}_{n=0}^{\infty}$ (h) $\left\{\left(1+\frac{1}{2n}\right)^n\right\}_{n=1}^{\infty}$
(c) $\left\{\frac{1}{n^{\log_5(3)}}\right\}_{n=1}^{\infty}$ (f) $\left\{\sec\left(\frac{\pi}{n}\right) - \sec\left(\frac{\pi}{n+1}\right)\right\}_{n=3}^{\infty}$ (i) $\left\{\frac{1}{n \ln(n) \ln(\ln(n))}\right\}_{n=4}^{\infty}$

2. (a) Determine for which values of p the series $\sum_{n=2}^{\infty} \frac{1}{n \ln(n)^p}$ converges or diverges.
(b) Determine for which values of p the series $\sum_{n=1}^{\infty} \frac{\ln(n)}{n^p}$ converges or diverges.