

1. True or False. Answer and briefly justify in each case (2pts each).

(a) If $\lim_{k \rightarrow +\infty} a_k = 5$ then the series $\sum_{k=1}^{\infty} a_k$ is convergent to 5.

(b) If $\sum_{k=1}^{\infty} a_k = 5$ then $\lim_{k \rightarrow +\infty} a_k = 5$.

(c) If $S_n = \sum_{k=1}^n a_k$ and $\lim_{n \rightarrow \infty} S_n = 5$, then $\sum_{k=1}^{\infty} a_k = 5$.

(d) The series $5 - 5 + 5 - 5 + 5 - 5 + \dots$ is divergent.

(e) If $\sum_{k=1}^{\infty} a_k = 5$ and $\sum_{k=1}^{\infty} b_k = 5$ then $\sum_{k=1}^{\infty} (2a_k - b_k) = 5$.

2. Determine if each of the following series is convergent or divergent. Justify your answer (2.5pts each)

(a) $\sum_{k=1}^{\infty} \frac{1}{\sqrt{k}}$

(b) $\sum_{k=2}^{\infty} \frac{1}{k \ln k}$

(c) $\sum_{k=1}^{\infty} \frac{1}{\sqrt[k]{\pi}}$

(d) $\sum_{k=2}^{\infty} \frac{1}{k^2 - 1}$