

10.4 AP Practice Problems (p.754) – Direct Comparison Test & Limit Comparison Test

1. Which of the following series converge?

$$\text{I. } \sum_{k=1}^{\infty} \frac{2\pi^k}{3^k\pi} \quad \text{II. } \sum_{k=1}^{\infty} \frac{k^2}{2k^3 + 1} \quad \text{III. } \sum_{k=1}^{\infty} \frac{k^2 + 3\sqrt[3]{k}}{2k^5}$$

- (A) I only (B) III only
(C) I and III only (D) II and III only

2. Which of the following series diverge?

$$\text{I. } \sum_{k=1}^{\infty} \frac{7k - 5}{k^3} \quad \text{II. } \sum_{k=1}^{\infty} \frac{k^2}{2k^3 + 1} \quad \text{III. } \sum_{k=1}^{\infty} \frac{k + 3}{(k - 3)^2 + 1}$$

- (A) II only (B) III only
(C) I and II only (D) II and III only

3. Determine whether the series $\sum_{k=1}^{\infty} \frac{\sin^2 k}{k^2 + 2k + 1}$ converges or diverges. Be sure to show your work.

4. Determine whether the series $\sum_{k=1}^{\infty} \frac{2k^2 - 1}{k(k^2 + 3)}$ converges or diverges. Be sure to show your work.