# INFINITE SERIES II

**1.** Find an estimate for the sum of the series that is correct to 2 decimal places: $\sum_{k=1}^{\infty} \frac{1}{k^5}$

**2.** Determine if the series converge or diverge:

a) $\sum_{k=1}^{\infty} \frac{k^3}{k^3 + k + 1}$

b) $\sum_{k=1}^{\infty} \frac{1 + 2^k}{3^k}$

c) $\sum_{k=2}^{\infty} \frac{1}{k(\ln k)^3}$

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**Theorem** (Comparison test). *Suppose that $0 \le a_k \le b_k$ for all $n \ge N$.*

*(1) If $\sum b_n$ converges, then $\sum a_n$ converges.*
*(2) If $\sum a_n$ diverges, then $\sum b_n$ diverges.*

**3.** Use the comparison test to show that the following series converge.

a) $\displaystyle\sum_{k=1}^{\infty} \frac{1+2^k}{2+3^k}$

b) $\displaystyle\sum_{k=2}^{\infty} \frac{1}{k^2(\ln k)^3}$

c) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{k\sqrt{k+1}}$

**4.** Use the comparison test to show that the following series diverge.

a) $\displaystyle\sum_{k=1}^{\infty} \frac{1+3^k}{2^k-1}$

b) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{\sqrt{k}\ln k}$