

Math 2000: Assignment #3, Winter 2006

A professor had a file with convergent series and another file with divergent series. Accidentally the files were mixed up. Please, help the professor to sort things out.

1. The telescoping technique will help.

a) $\sum_{n=0}^{\infty} \frac{1}{(n+1)(n+2)(n+3)}$

b) $\sum_{n=1}^{\infty} \frac{1}{(2n-1)(2n+1)}$

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

2. The comparison tests might be useful.

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

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

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

d) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{2n^3+1}}$

e) $\sum_{n=1}^{\infty} \frac{n+2}{\sqrt{2n^3+1}}$

f) $\sum_{n=1}^{\infty} (2n^8 + n^6 + n + 1)^{-1/7}$

g) $\sum_{n=1}^{\infty} \frac{2^n}{3^n+4}$

h) $\sum_{n=1}^{\infty} \frac{3^n}{2^n+4}$

i) $\sum_{n=1}^{\infty} \frac{2^n + 3^{n/2} + 2^{2n}}{3^n}$

j) $\sum_{n=1}^{\infty} \frac{n!}{(n+1)!}$

k) $\sum_{n=1}^{\infty} \frac{n!}{(n+2)!}$

l) $\sum_{n=1}^{\infty} \frac{1}{n!}$

m) $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$

n) $\sum_{n=1}^{\infty} \cos\left(\frac{1}{n}\right)$

o) $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n^2}\right)$

3. Which of the alternating series is convergent?

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

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

c) $\sum_{n=1}^{\infty} (-1)^n \sin\left(\frac{1}{n}\right)$

d) $\sum_{n=1}^{\infty} (-1)^n \cos\left(\frac{1}{n}\right)$

e) $-\frac{1}{3} + \frac{2}{4} - \frac{3}{5} + \frac{4}{6} - \frac{5}{7} + \cdots$

f) $-\frac{1}{3} + \frac{1}{4} - \frac{1}{5} + \frac{1}{6} - \frac{1}{7} + \cdots$