Use the integral test to determine whether the series is convergent or divergent.

1) $\sum_{n=1}^{\infty} \frac{1}{n^4}$

2) $\sum_{n=1}^{\infty} \frac{1}{\sqrt[4]{n}}$

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

4) $\sum_{n=1}^{\infty} e^{-n}$

5) $\sum_{n=1}^{\infty} ne^{-n}$

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

Determine whether the series is convergent or divergent.

7) $\sum_{n=1}^{\infty} \left(n^{-1.4} + 3n^{-1.2}\right)$

8) $1 + \frac{1}{8} + \frac{1}{27} + \frac{1}{64} + \frac{1}{125} + \cdots$

9) $\sum_{n=1}^{\infty} \frac{5-2\sqrt{n}}{n^3}$

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

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

12) $\sum_{n=1}^{\infty} \frac{1}{n^2-4n+5}$

13) $\sum_{n=1}^{\infty} ne^{-n^2}$

14) $\sum_{n=1}^{\infty} \frac{\ln n}{n^2}$

15) $\sum_{n=3}^{\infty} \frac{1}{n \cdot \ln n \cdot \ln(\ln n)}$

Find the values of p for which the series is convergent.

16) $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^p}$

17) For the series $\sum_{n=1}^{\infty} \frac{1}{n^4}$ find the following:

a) Find the partial sum s_{10} of the series. Estimate the error in using s_{10} as an approximation to the sum of the series.

b) Use $s_n + \int_{n+1}^{\infty} f(x)\, dx \le s \le s_n + \int_{n}^{\infty} f(x)\, dx$ with $n = 10$ to give an improved estimate of the sum.

c) Find a value of n so that s_n is within 0.00001 of the sum.