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

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

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

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

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

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

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

Determine whether the series is convergent or divergent.

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

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

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

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

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

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

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

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

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

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

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

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.

a) $s_{10} \approx 1.082037$, error is at most $0.000\overline{3}$
b) $s \approx 1.08233$, error $\le$ 0.00005
c) $n > 32$