1.) Determine convergence or divergence of each series using the test indicated. I suggest that you read all of the assumptions and conclusions for each test from the handout I gave last time as you do each problem.

   a.) $\sum_{n=0}^{\infty} \frac{3^{n-1}}{(n+1)!}$ (Use the ratio test.)

   b.) $\sum_{n=1}^{\infty} \left(1.01 - \frac{5}{n^3}\right)^n$ (Use the root test.)

   c.) $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{7}{n^2 + 3}$ (Use the alternating series test.)

   d.) $1 + \frac{1}{3} - \frac{1}{3^2} + \frac{1}{3^3} + \frac{1}{3^4} - \frac{1}{3^5} + \frac{1}{3^6} + \frac{1}{3^7} - \frac{1}{3^8} + \ldots$ (Use the absolute convergence test.)

   e.) $\sum_{n=0}^{\infty} (-1)^n (1/10)$ (Use the sequence of partial sums test.)

   f.) $\sum_{n=1}^{\infty} \sqrt{n + 1 \over n^3 + 8}$ (Use the limit comparison test.)

2.) Use a geometric series to convert the decimal number $0.777777777\ldots$ to a fraction.

3.) The series $\sum_{n=1}^{\infty} \frac{1}{n}$ diverges.

   a.) Use equation (*) to determine between which two numbers the partial sum $S_{50} = \sum_{i=1}^{50} \frac{1}{i}$ lies.

   b.) What should $n$ be in order that the partial sum $S_n = \sum_{i=1}^{n} \frac{1}{i}$ be at least 20 ?

   c.) What is the largest value of $n$ for which the partial sum $S_n = \sum_{i=1}^{n} \frac{1}{i}$ does not exceed 50 ?

4.) The series $\sum_{n=1}^{\infty} \frac{1}{n^3}$ converges.

   a.) Compute the partial sum $S_5 = \sum_{i=1}^{5} \frac{1}{i^3}$. Use (*) to estimate the resulting error.
b.) What should $n$ be in order that the partial sum $S_n = \sum_{i=1}^{n} \frac{1}{i^3}$ estimate the exact value of the series with error at most 0.0001?

5.) The alternating series $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n^3}$ converges.

a.) Compute the partial sum $S_5 = \sum_{i=1}^{5} (-1)^{i+1} \frac{1}{i^3}$. Estimate the resulting absolute error. Between what two numbers does the exact value of the series lie?

b.) What should $n$ be in order that the partial sum $S_n = \sum_{i=1}^{n} (-1)^{i+1} \frac{1}{i^3}$ estimate the exact value of the series with absolute error at most 0.0001?

"What is important is to keep learning, to enjoy challenge, and to tolerate ambiguity. In the end there are no certain answers." – Martina Horner