Section 9.5

After viewing the lecture videos and reading the textbook, you should be able to answer the following questions:

The Ratio Test

Let $\sum u_k$ be a series with positive terms and suppose

$$\lim_{k\to\infty} \frac{u_{k+1}}{u_k} = \rho$$

a) If $\rho < 1$, the series converges.

b) If $\rho > 1$ or $\rho = \infty$, the series diverges.

c) If $\rho = 1$, the series may converge or diverge.

1. Simplify the following expressions:
   a) $\frac{n!}{(n+1)!}$
   b) $\frac{(n+3)!}{n!}$
   c) $\frac{(2n)!}{(2(n+1))!}$
2. According to the Ratio Test, do the following series converge, diverge, or is the Ratio Test inconclusive?
   a) $\sum_{k=1}^{\infty}\left(\frac{1}{3k^5}\right)$
   b) $\sum_{k=1}^{\infty}\left(\frac{1}{3\cdot 2^k}\right)$
   c) $\sum_{k=1}^{\infty}\left(\frac{k+1}{k!}\right)$