One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. Solutions with little or no justification will receive little or no credit.

(1) Do problems 1.60, 1.62, 1.66 and 1.67 from page 41.

(2) Determine whether each of the following series converges or diverges.
   (a) $\sum_{n=0}^{\infty} e^{-n}$
   (b) $\sum_{n=1}^{\infty} \frac{(n-1)!}{n^2}$
   (c) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt{3n-1}}$

(3) Please do this problem on a separate page.

Your author describes the following Alternating Series Test for convergence:

**Theorem 1.** Let $\{a_n\}$ denote a positive, decreasing sequence that converges to zero. Then the alternating series

$$\sum_{n=1}^{\infty} (-1)^{n-1}a_n$$

converges.

Suppose we omit the hypothesis that the sequence $\{a_n\}$ is decreasing. (We assume $\{a_n\}$ is not eventually decreasing.) Is it possible to find a sequence $\{a_n\}$, satisfying all other hypotheses of the theorem, so that the series $\sum_{n=1}^{\infty} (-1)^{n-1}a_n$ converges? Either find such an example, or prove that no such example exists.

*Date: February 6, 2012.*