ASSIGNMENT 4

There are two parts to this assignment. The first part is on WeBWorK — the link is available on the course webpage. The second part consists of the questions on this page. You are expected to provide full solutions with complete justifications. You will be graded on the mathematical, logical and grammatical coherence and elegance of your solutions. Your solutions must be typed, with your name and student number at the top of the first page. If your solutions are on multiple pages, the pages must be stapled together.

Your written assignment must be handed in before your recitation on Friday, October 9. The online assignment will close at 9:00 a.m. on Friday, October 9.

1. Suppose

$$\lim_{n \to \infty} \left| \frac{a_{n+1}}{a_n} \right| = 1$$

Explain why it is false to draw any conclusions from this equality about the convergence of $\sum_{n\geq 1} a_n$.

2. Let
$$a_n = \begin{cases} \frac{n^2}{2n} & \text{if } n \text{ is prime} \\ \frac{1}{n^3} & \text{otherwise} \end{cases}$$
. Determine if $\sum_{n \ge 1} (-1)^{n-1} a_n$ converges.

3. (a) Explain how the terms in ∑_{n≥1} (-1)ⁿ⁻¹/n may be rearranged so that the series converges to 2.
(b) Explain how the terms in ∑_{n≥1} (-1)ⁿ⁻¹/n may be rearranged so that the series diverges to ∞.