SECTION 5.5: ALTERNATING SERIES

1. The Alternating Series Test (AST)

2. Determine whether the alternating series below converge or diverge. Justify your conclusion by checking the requirements of the AST.

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1} n}{3n+1}$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n} n}{2^n}$

(c) $\displaystyle\sum_{n=3}^{\infty} \frac{(-1)^{n-1}}{\ln(\ln n)}$

3. Consider the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$.

(a) Show the series converges. (Justify by checking a test.) We will call the sum S.

(b) Show the series converges absolutely. (Justify by checking a test.)

(c) Find S_3. Estimate $R_3 = S - S_3$ using the idea of alternating series remainders.

(d) Determine how large k needs to be so that the kth partial sum, S_k, is within $0.0001 = 10^{-4}$ of the sum of the series?

4. For each series below, determine if the series is absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2n+1}$

(b) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}(n-1)!}{n!}$