

Due: Monday, October 17th, 2012

Problems to be turned in: 2, 4

1. Assume $a_n > 0$ and that $\sum_{n=1}^{\infty} a_n < \infty$. Does it imply that $\sum_{n=1}^{\infty} \sqrt{a_n a_{n+1}} < \infty$?
2. Find the radius of convergence of the series $\sum_{n=1}^{\infty} nx^n$ and within the radius of convergence give an explicit expression for its sum.
3. Let a_n be a sequence of real numbers and a_{n_k} be a subsequence of the same. Suppose $\sum_{k=1}^{\infty} a_k < \infty$ then does it imply $\sum_{k=1}^{\infty} a_{n_k} < \infty$?

4. Let $p \in \mathbb{R}$. Decide whether

$$\sum_{n=1}^{\infty} (-1)^n \frac{\sqrt{n}}{(n+1)^p}$$

converges or not.

5. Suppose two teams play a series of games, each producing a winner and a loser, until one team has won two more games than the other. Let G be the total number of games played. Assuming each team has chance 0.5 to win each game, independent of results of the previous games. Find the expected value of G .