Hw 5

Read chapter 9.1 of the textbook.

Main skills:

- You need to know what absolute convergence is

- You need to know the ratio test

- You need to know the alternating series test

Do the following problems:

1. Decide if the following series are convergent or divergent, explain your reasoning:

   a) $\sum_{i=1}^{\infty} ln(i)$ b) $\sum_{i=1}^{\infty} \frac{i}{3^i}$

2. Decide if the following series are absolutely convergent, convergent but not absolutely convergent or divergent, explain your reasoning:

   a) $\sum_{i=1}^{\infty}(-1)^i \frac{1}{7i-5}$ b) $\sum_{i=1}^{\infty} \frac{sin(i)}{i^2+2}$ c) $\sum_{i=1}^{\infty}(-1)^i \frac{i^2}{i(i+1)}$ d) $\sum_{i=1}^{\infty} \frac{(-1)^i}{\sqrt{i+1}}$

3. Prove that if $\sum_{n=1}^{\infty} a_n$ and $\sum_{n=1}^{\infty} b_n$ are both absolutely convergent then $\sum_{n=1}^{\infty}(a_n + b_n)$ is absolutely convergent.

4. For which values of x does the series $\sum_{n=1}^{\infty} \frac{x^n}{3n}$ converge absolutely? For which values of x does it converge ?.

5. Suppose $\{a_n\}$ is a decreasing sequence converging to 0 and let $\{b_n\}$ be the sequence :

$$a_1, a_2, a_3, -a_4, -a_5, -a_6, a_7, a_8, a_9, -a_{10}, -a_{11}, -a_{12} \cdots$$

Prove that $\sum_{n=1}^{\infty} b_n$ converges.