Hw 4 Part 1

Read chapter 9.1 of the textbook.

Main skills:

- You need to know the definition of series.
- You need to know about geometric and harmonic series
- You need to know the comparison test
- You need to know the limit test

Do the following problems:

1. Decide if the following series are convergent or divergent, explain your reasoning:
   a) $\sum_{i=1}^{\infty} \frac{1}{7i-5}$ b) $\sum_{i=1}^{\infty} \frac{1}{3i+5}$ c) $\sum_{i=1}^{\infty} \frac{1}{i^2+2}$ d) $\sum_{i=1}^{\infty} \frac{1}{i(i+1)}$ e) $\sum_{i=1}^{\infty} \frac{5}{3^i}$
   f) $\sum_{i=1}^{\infty} 5 \cdot 3^i$ g) $\sum_{i=1}^{\infty} \frac{2}{3^i+5}$ h) $\sum_{i=1}^{\infty} \frac{2}{3^i-5}$ i) $\sum_{i=1}^{\infty} (\frac{i+2}{i^2+3})^2$
2. Prove that if $\sum_{i=0}^{\infty} a_i$ converges to a and $\sum_{i=0}^{\infty} b_i$ converges to b then $\sum_{i=0}^{\infty} (a_i + b_i)$ converges to $a+b$.
3. Prove that if $\sum_{i=0}^{\infty} a_i$ diverges and $\alpha \neq 0$ then $\sum_{i=0}^{\infty} \alpha a_i$ diverges as well