Question 1 (30 pts)

(10) a) State the comparison test

(20) b) Using the (limit) comparison test, decide whether the series \( \sum_{n=1}^{\infty} \frac{n}{n^3 + \ln n} \) is convergent or divergent
Question 2 (30 pts)

(10) a) State the ratio test

(20) b) What does the ratio test say about the convergence of the series \( \sum_{n=1}^{\infty} \frac{n^2}{(2n)!} \)?
Question 3 (40 pts)
(10) a) State the alternating series test.

Given the series $\sum_{n=2}^{\infty} (-1)^n \frac{2}{n-1}$, answer the following questions

(10) b) Using alternating series test, show that the series is convergent.

(10) c) Explain whether the series is absolutely convergent or not.

(10) d) From b) and c), deduce the convergence type of the series?