1. Show that $\displaystyle\sum_{k=3}^{\infty} \frac{(-1)^k}{3k + \sin(k)}$ converges conditionally, and find a value of $N$ so that the $N$th partial sum approximates the value of the series within $10^{-5}$.

2. Show that $\displaystyle\sum_{k=1}^{\infty} ke^{-k}$ converges, and find upper and lower bounds on the limit.

3. Determine if $\displaystyle\sum_{j=2}^{\infty} \frac{2\ j!}{(2j)!}$ converges or diverges.