1. Determine whether or not the following series converge. Explain your reasoning.

(a) $\displaystyle\sum_{n=1}^{\infty} ne^{-n^2}$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2 - 1}{n^3 + 1}$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{2 + \sin n}$

2. (a) Show that $\sum_{n=1}^{\infty}(-1)^{n-1}\dfrac{\sqrt{n}}{n+1}$ converges conditionally.

(b) If $S = \sum_{n=1}^{\infty}(-1)^{n-1}\dfrac{\sqrt{n}}{n+1}$ is the series above and $S_N = \sum_{n=1}^{N}(-1)^{n-1}\dfrac{\sqrt{n}}{n+1}$ is the Nth partial sum, find a value of N which guarantees that the absolute value of the remainder $R_N = S - S_N$ is less or equal 0.25.