Series

1. Prove by induction that $\sum_{n=1}^{k} n = 1 + 2 + 3 + \cdots + k = \frac{k(k+1)}{2}$

2. We contradicted the assumption that $\{(-1)^k\}$ converges by choosing $\varepsilon = 1$. What other values of epsilon could have been used to reach a contradiction?

3. Using the proof that $\{(-1)^k\}$ does not converge as a model, prove that the sequence $\{\frac{\sin(k\pi/2)}{8}\}$ does not converge.

4. Prove that $\sum_{n=1}^{\infty} \left(\frac{1}{\sqrt{n}} - \frac{1}{\sqrt{n+1}} \right)$ converges.

    a) What does the kth partial sum s_k look like?
    b) Show that the sequence $\{s_k\}$ of kth partial sums converges