Instructions: Show Your Work!

1. (3 pts) Calculate, if exists, the limit of the sequence.
   \[ \{ \ln (2n + 1)^2 - \ln (n + 1) \} . \]

2. (3 pts) Determine whether the series is convergent or divergent. If it is convergent, find its sum.
   \[ \sum_{n=1}^{\infty} \left[ \frac{1}{\pi^n} - \frac{1}{n(n+1)} \right] \]

3. (4 pts) Use the integral test to determine whether the series is convergent or divergent
   \[ \sum_{n=1}^{\infty} \left[ \frac{\ln n}{n^x} \right] \]
Instructions: Show Your Work!

1. (3 pts) Calculate, if exists, the limit of the sequence.
   \[ \sqrt[\sqrt{2+4n}]. \]

2. (3 pts) Determine whether the series is convergent or divergent. If it is convergent, find its sum.
   \[ \sum_{n=1}^{\infty} \left( \frac{1}{e^n} + \frac{1}{n(n+1)} \right) \]

3. (4 pts) Use the integral test to determine whether the series is convergent or divergent
   \[ \sum_{n=1}^{\infty} \left( \frac{\ln(n)}{n^3} \right) \]