There are 5 problems on this exam. There are a total of 100 points possible. You must show all of your work for credit.

Problem 1: ( points) Use the Integral Test on the series to determine if the series converges or diverges. \( \sum_{n=1}^{\infty} \frac{1}{2n + 1} \). You must show all the steps of the test.

Problem 2: ( points) Determine if the following series converges or diverges. You must tell me which test you used and show all of the steps involved in the test.
   a) \( \sum_{n=1}^{\infty} \frac{3n^3 - 4n + 8}{2n^6 - 16n + 29} \)
   b) \( \sum_{n=1}^{\infty} (4 + (-1)^n) \)
   c) \( \sum_{n=1}^{\infty} \frac{2}{5^n - 8} \)

Problem 3: ( points) Consider the following sequence \( a_n = \frac{(n - 2)!}{n!} \).
   a) Write out the first five terms of the sequence.
   b) The domain of the sequence is:
   c) determine if the sequence converges or diverges. If it converges, then tell me what it converges to.

Problem 4: ( points) Find the sum of each of the following convergent series.
   a) \( \sum_{n=1}^{\infty} \left( \frac{1}{n} - \frac{1}{n + 1} \right) \)
   b) \( \sum_{n=0}^{\infty} 6(-1/2)^n \)

Problem 5: ( points) Determine if the series converges absolutely or conditionally. Tell me which test you used and show all of the required steps.
   a) \( \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\ln(n + 1)} \)
   b) \( \sum_{n=1}^{\infty} (-1)^n e^{-n} \)

Extra Credit: (5 points) Determine the convergence or divergence of the series using the Direct Comparison Test. \( \sum_{n=1}^{\infty} \frac{1}{2^n + 11} \)