Written Homework

Your carefully written solutions to the following questions will be due at the beginning of class on Monday, July 20.

1. For each of the following three series, determine if it converges absolutely or conditionally. (A series is called conditionally convergent if it is convergent but not absolutely convergent – remember that absolutely convergent is stronger than just convergent.) Be sure to cite the name of any test or theorem you use, and to show that all the necessary hypotheses are satisfied.
   (a) \( \sum_{n=1}^{\infty} \frac{n(-1)^n}{n^2+1} \)
   (b) \( \sum_{j=1}^{\infty} \frac{(-1)^j}{\sqrt{j^3+1}} \)
   (c) \( \sum_{m=3}^{\infty} \frac{(-1)^{m+1}}{\ln m} \)

2. For which value(s) of \( x \) is the series \( \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{n+2} \) absolutely convergent? For which value(s) of \( x \) is the series conditionally convergent?

3. Consider the points \( A(2, 3, 1), B(4, 7, 3), C(3, 2, -1) \) and \( D(-3, -1, 2) \).
   (a) Find a vector equation for the line through \( A \) and \( B \).
   (b) Find parametric equations for the line through \( C \) and \( D \).
   (c) Does the line through \( A \) and \( B \) intersect with the line through \( C \) and \( D \)? If so, at what point?

4. Find an equation for the plane through the points \( A(1, 1, 0), B(0, 2, 3) \) and \( C(2, -2, 4) \). Write the equation in the form \( ax + by + cz = d \).