Math 213 C,D. Fall, 2014. Worksheet 13

Determine if the following series converge absolutely, converge conditionally, or diverge. Give complete justification, and state which test or tests you are using.

1. \[ \sum_{n=2}^{\infty} \frac{(-1)^{n+1} \ln n}{\sqrt{n}}. \]

2. \[ \sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdots (2n - 1)}{2 \cdot 5 \cdot 8 \cdots (3n - 1)}. \]

3. \[ \sum_{n=1}^{\infty} \frac{n!}{e^n}. \]

4. You are given that \( \sum c_n (-3)^n \) converges, and that \( \sum c_n 5^n \) diverges.
   a) What are the possible values of the radius of convergence of the power series \( \sum c_n x^n \)?

   What can you say about the convergence/divergence of the following series?
   b) \( \sum c_n (-6)^n \)
   c) \( \sum c_n 2^n \)
   d) \( \sum c_n 4^n \)
   e) \( \sum c_n (-5)^n \)
For these four series, use either the ratio or the root test to determine the radius of convergence. Then determine the interval of convergence.

5. \( \sum_{n=1}^{\infty} \frac{n^2 x^{2n}}{(2n)!} \).

6. \( \sum_{n=1}^{\infty} (-1)^n \frac{(x - 3)^n}{n \cdot 5^n} \).

7. \( \sum_{n=1}^{\infty} (-1)^n \frac{(x - 3)^{2n}}{n \cdot 5^n} \).

8. \( \sum_{n=1}^{\infty} \frac{x^n}{e^{n^2}} \) (use the root test).