1. Does $\sum_{n=1}^{\infty} \frac{1}{n^2 \ln n}$ converge or diverge, and why?
2. Does \( \sum_{n=1}^{\infty} \frac{1}{n^{2/3} + 1} \) converge or diverge, and why?
3. Does $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n^{2/3}}$ converge absolutely, conditionally, or not at all?
4. Does \( \sum_{n=1}^{\infty} \frac{|n!|^2}{(2n)!} \) converge or diverge, and why?
5. Find the fourth Taylor polynomial of the function $f(x) = e^{-x}$. 
6. For which values of $x$ does the series \( 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \cdots \) converge?