Part I. All problems in part I are worth 11 points each.

(1) Evaluate the following limit: \( \lim_{n \to \infty} \frac{\ln(n)}{n} \).

(2) Determine if the series \( \sum_{n=1}^{\infty} \frac{(-1)^n}{n!} \) is absolutely convergent, conditionally convergent, or divergent.
(3) If the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$ is convergent, estimate its sum with an error less than $10^{-3}$. [You do not need to compute and add the terms in the finite sum.]

(4) Determine the interval and radius of convergence of the sum $\sum_{n=1}^{\infty} \frac{(-1)^nx^n}{3^n \cdot n^2}$.

(5) Find the interval and radius of convergence of the series $\sum \frac{(2x+1)^n}{(2n)!}$. 
(6) Express the function $f(x) = \frac{3}{2+x}$ as a power series. You must state the interval of convergence for the series.

**Part II.** All problems in part II are worth 17 points.

(7) Express the function $f(x) = \frac{1}{(2+x)^2}$ as a power series. You must state the interval of convergence of the series.
(8) Use power series to approximate \( \int_{0}^{1/10} \frac{1}{1+x^7} \, dx \) with an error less than \((10)^{-10}\). [You
do not need to compute and add the terms in the sum.]