The Alternating Series, Ratio, and Root Tests- HW Problems

Determine if the following series converge or diverge.

1. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

2. $\sum_{n=1}^{\infty} \frac{[\cos(n+1)\pi][n]}{n^2+1}$

3. $\sum_{n=1}^{\infty} \frac{(-1)^n(2n-1)}{3n+1}$

4. Show that $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^5}$ converges and determine how many terms of the sum are necessary so that the absolute value of the error between the partial sum and the entire sum is less than 0.0001.

5. Approximate the sum so that the absolute value of the error is less than 0.0001.

a. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$

b. $\sum_{n=1}^{\infty} \frac{(-1)^n}{(n+1)^4}$

Determine if the following series are absolutely convergent, conditionally convergent, or divergent.

6. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n!}$

7. $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}$

8. $\sum_{n=1}^{\infty} \frac{\cos(n)}{n^3}$

9. $\sum_{n=1}^{\infty} \frac{(2n)!}{10^n}$

10. $\sum_{n=1}^{\infty} \frac{e^n}{n^n}$

11. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n(\ln(n))^2}$

12. $\sum_{n=1}^{\infty} \frac{(-1)^n 3^{(n-1)}}{n(2^{2n})}$

13. $\sum_{n=1}^{\infty} \left(\frac{n^2+3}{3n^2+1}\right)^n$

14. $\sum_{n=1}^{\infty} \frac{n!}{n(4^n)}$