• Please see the course webpage for the answer key.

Determine whether the given series is **Absolutely Convergent**, **Conditionally Convergent**, or **Divergent**. Name any Convergence Test(s) you use, and justify all of your work.

1. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \, \frac{n^4+7}{n^7+4}$

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

3. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{4n+7}$

4. $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n \; (2n)! \; \ln n}{5^n \; (n!)^2}$

5. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \, \frac{n+5}{n^9+3}$

6. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \, \frac{n}{n^2+6}$

7. $\displaystyle\sum_{n=1}^{\infty} \frac{(3n)!}{(n!)^2 \; 2^{4n} \; n^n}$

8. Use **Two Different** methods to show that $\displaystyle\sum_{n=2}^{\infty} \frac{e^n}{\ln n}$ Diverges.

9. Use the **Absolute Convergence Test** to show that $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{n^6+7}$ Converges.

10. Use the Series $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{n^n}$ to show that $\displaystyle\lim_{n\to\infty} \frac{n!}{n^n} = 0$.