Calculus II
Practice Problems 8

For each problem, determine whether or not the series converges or diverges. Give your reasoning.

1. $\displaystyle\sum_{n=1}^{\infty} \frac{n+1}{n^3}$

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

3. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{n}{n+21}$

4. $\displaystyle\sum_{n=1}^{\infty} \frac{2^n}{n!}$

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

6. $\displaystyle\sum_{n=1}^{\infty} \frac{n^{5/2}}{n^4 - n^3 + n^2 + 1}$

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

8. $\displaystyle\sum_{n=1}^{\infty} \frac{n^2+1}{n^3\sqrt{n}}$

9. $\displaystyle\sum_{n=1}^{\infty} \frac{\ln n}{n^2}$

10. $\displaystyle\sum_{n=1}^{\infty} \frac{2^n n^3}{n!}$

11. For what positive integers k (if any) does the following series converge? Give your reasoning.

$$\sum_{n=k}^{\infty} \frac{k!(n-k)!}{n!}$$