Homework on Convergence of Series

In each case, tell whether the given series converges absolutely, converges, or diverges, and justify your answer. (These questions were taken directly from Varberg, Purcell and Rigdon, *Calculus,* 9th ed., page 506.)

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

2. $\displaystyle\sum_{n=1}^{\infty} \frac{n+5}{1+n^2}$

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

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

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

6. $\displaystyle\sum_{n=1}^{\infty} \frac{n}{e^{n^2}}$

7. $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+1}{10n+12}$

8. $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2+7}$

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

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

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

12. $\displaystyle\sum_{n=1}^{\infty} \left(1-\frac{1}{n}\right)^n$

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

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

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

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

17. $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{3^n}{2^{n+8}}$

18. $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n \sqrt[n]{n}}{\ln n}$