Determine whether the following series converge or diverge. If a series converges and the terms are not eventually positive, determine whether or not the convergence is absolute.

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

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

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

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

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

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

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

8. $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(3n)}{1+(1.2)^n}$

9. $\displaystyle\sum_{n=1}^{\infty} \frac{1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n-1)}{5^n n!}$

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

11. $\sum_{n=1}^{\infty}(1-\cos(1/n))$ [Hint: compare to $\sum_{n}\frac{1}{n^2}$.]

12. $\sum_{n=1}^{\infty}\frac{8^n}{n!}$

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

14. $\sum_{n=1}^{\infty}\frac{\cos(n\pi)}{n}$

15. $\sum_{n=1}^{\infty}\frac{\tan(1/n)}{n^{3/2}}$

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

17. $\displaystyle\sum_{n=1}^{\infty} \sin(1/n^2)$

18. $\displaystyle\sum_{n=1}^{\infty} \cos(1/n^2)$

19. $\displaystyle\sum_{n=1}^{\infty} \tan(1/n^2)$

20. $\displaystyle\sum_{n=1}^{\infty} ne^{-n^2}$