Determine whether the series converges or diverges.

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

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

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

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

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

6) $\displaystyle\sum_{n=1}^{\infty}\frac{\cos^{2}n}{n^{2}+1}$

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

8) $\displaystyle\sum_{n=1}^{\infty}\frac{n-1}{n4^{n}}$

9) $\displaystyle\sum_{n=1}^{\infty} \frac{2+(-1)^n}{n\sqrt{n}}$

10) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2+1}}$

11) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{1+\sqrt{n}}$

12) $\displaystyle\sum_{n=1}^{\infty} \frac{5+2n}{(1+n^2)^2}$

13) $\displaystyle\sum_{n=1}^{\infty} \frac{1+n+n^2}{\sqrt{1+n^2+n^6}}$

14) $\displaystyle\sum_{n=1}^{\infty} \left(1+\frac{1}{n}\right)^2 e^{-n}$

15) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n!}$

16) $\displaystyle\sum_{n=1}^{\infty} \frac{n!}{n^n}$

17) $\displaystyle\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$

Use the sum of the first 10 terms to approximate the sum of the series. Estimate the error.

18) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^4 + n^2}$

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