

Determine whether the series converges or diverges.

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

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

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

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

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

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

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

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

$$9) \sum_{n=1}^{\infty} \frac{2+(-1)^n}{n\sqrt{n}} \quad \boxed{\text{Convergent}}$$

$$10) \sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2+1}} \quad \boxed{\text{Divergent}}$$

$$11) \sum_{n=1}^{\infty} \frac{1}{1+\sqrt{n}} \quad \boxed{\text{Divergent}}$$

$$12) \sum_{n=1}^{\infty} \frac{5+2n}{(1+n^2)^2} \quad \boxed{\text{Convergent}}$$

$$13) \sum_{n=1}^{\infty} \frac{1+n+n^2}{\sqrt{1+n^2+n^6}} \quad \boxed{\text{Divergent}}$$

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

$$15) \sum_{n=1}^{\infty} \frac{1}{n!} \quad \boxed{\text{Convergent}}$$

$$16) \sum_{n=1}^{\infty} \frac{n!}{n^n} \quad \boxed{\text{Convergent}}$$

$$17) \sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right) \quad \boxed{\text{Divergent}}$$

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

$$18) \sum_{n=1}^{\infty} \frac{1}{n^4 + n^2} \quad \boxed{s_{10} \approx 0.567975, \text{ error} \leq 0.000\bar{3}}$$

$$19) \sum_{n=1}^{\infty} \frac{1}{1 + 2^n} \quad \boxed{s_{10} \approx 0.76352, \text{ error} \leq 0.00098}$$