

Do the following converge or diverge?

1. $\sum_{k=1}^{\infty} \frac{2k+2}{5k+17}$

2. $\sum_{k=4}^{\infty} \frac{\sin(\pi^3 - 13)^k}{2^k}$

3. $\sum_{k=13}^{\infty} \frac{1}{k^2 + 1}$

4. $\sum_{k=42}^{\infty} \frac{3^k + \sin(k)}{\cos(k) + 5}$

5. $\sum_{k=3}^{\infty} k^3 e^{-k^2}$

6. $\sum_{k=3}^{\infty} \frac{1}{k \ln(k)}$

7. $\int_1^{\infty} \frac{e^x}{3^{x+1}} dx$

8. $\sum_{k=3}^{\infty} \frac{1}{7^k - 3}$