

Do the following converge or diverge?

Can you find the value of the convergent series? If not, can you approximate it?

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

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

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

$$4. \sum_{k=3}^{\infty} \frac{1}{3^k+2}$$

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

$$6. \sum_{k=3}^{\infty} k^3 e^{-k^2}$$

$$7. \sum_{k=3}^{\infty} \frac{1}{k \ln(k)}$$

$$8. \int_1^{\infty} \frac{e^x}{3^{x+1}} dx$$