

1. Write out the first few terms of the following series to show how the series starts. Then find the sum of the series.

$$\sum_{n=0}^{\infty} (-1)^n \frac{5}{4^n}$$

2. Rewrite  $3.1\overline{23} = 3.12323232323 \dots$  using a geometric series, and then express it as the ratio of two integers.

3. Does the following series converge or diverge? If it converges, find its sum.

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

4. Does the following series converge or diverge? If it converges, find its sum. (Hint: Use log properties first to rewrite  $\ln \frac{\sqrt{n}}{\sqrt{n+1}}$ .)

$$\sum_{n=1}^{\infty} \ln \frac{\sqrt{n}}{\sqrt{n+1}}$$

**Challenge:** Find the value for  $b$  for which  $1 + e^b + e^{2b} + e^{3b} + \dots = 9$ .

**Challenge:** If  $\sum a_n$  and  $\sum b_n$  both diverge, must  $\sum(a_n + b_n)$  diverge?

Q: What has many keys but can't open any doors?