

**EXERCISE ONE** Let  $\{a_n\}_{n=1}^{+\infty}$  be a sequence of real numbers whose terms are

$$2, -\sqrt{2}, 1, -\frac{\sqrt{2}}{2}, \frac{1}{2}, \dots$$

Assume that the pattern continues. Prove that the series  $\sum_{n=1}^{+\infty} a_n$  converges and give its sum.

**EXERCISE TWO** Consider the series  $\sum_{n=1}^{+\infty} \frac{n^2+1}{127n^2+1}$ . Does it converge? Please justify your answer.