

PROBLEM 3

Sequences and Series

In a sequence, if $t_n = \sum_{k=1}^n \left(\frac{1}{x}\right)^{k-1} + \sum_{k=1}^n \left(-\frac{1}{x}\right)^{k-1}$:

- Determine an expression for t_1 , t_2 , t_3 , and t_4 .
- Determine an expression for t_{10} and the value of t_{10} if $x = 2$. (Answer in fraction form.)
- Evaluate t_∞ if $x = 2$.
- If $t_\infty = \frac{9}{4}$, determine the value of x .
- If $t_\infty = p$, determine an expression for x in terms of p .