WMU Math Club
Math Challenge Problem
September 2023

The Problem.

> Let p be an integer with $p \geq 2$ and define a sequence by
>
> $$x_n = \prod_{j=0}^{n-1} \frac{n+jp+1}{n+jp},$$
>
> for each positive integer n. Assuming $\lim_{n \to \infty} x_n$ exists, evaluate it.

Instructions.

1. Solve the problem.

2. Type your solution to the problem, preferably in TEX/LATEX.

3. Email your solution to `david.richter@wmich.edu` with the phrase "September Challenge Problem" in the subject field before October 1, 2023.

More Information. If you submit the best solution, explained clearly and completely (and succinctly), then your solution will be posted on the WMU Math Club bulletin board next month, you will be recognized as the winner during the next meeting of the WMU Math Club, and you will receive a prize (probably a book). All undergraduate and graduate students may submit solutions. Please include your name in your write-up. Please make contact with Prof. David Richter if you have any questions.

Report from April 2023. Ritabrato Chatterjee (WMU) and David Shen (KAMSC) each submitted a correct solution, judged equally valid. $\sqrt{\mathbf{W}}$