Indian Institute of Space Science and Technology

Department of Mathematics

Maths Club — Weekly Challenge #2

Date: October 21, 2025

Challenge Question — Difficulty: ★★★★★

Let D_n be the determinant of the following $n \times n$ tridiagonal matrix A_n:

$$A_n = \begin{pmatrix} 3 & 1 & 0 & \cdots & 0 & 0 \\ 2 & 3 & 1 & \cdots & 0 & 0 \\ 0 & 2 & 3 & \cdots & 0 & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & 0 & \cdots & 3 & 1 \\ 0 & 0 & 0 & \cdots & 2 & 3 \end{pmatrix}$$

The matrix has 3's on the main diagonal, 1's on the superdiagonal(above the main diagonal), and 2's on the subdiagonal(below the main diagonal).
Find a closed-form expression for the determinant D_n in terms of n.

Instructions:

- Submit your detailed solution (typed or handwritten) by **31 Oct, 2025**.
- Use the link below for submission:

Submit Here: Maths Club – Weekly Challenge Submission

- Selected solutions will be featured in the **Maths Club GitHub repository**.