Step-1

Let $A = (a_{ij})_{n\times n}$ where

$a_{ij} = ij$ for $1 \le i, j \le n$

Then

$A_1 = (1)$ so $\det A_1 = 1$ (exceptional case)

$A_2 = \begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix}$ so that $\det A_2 = 0$

$A_3 = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{pmatrix}$ so that

Step-2

$\det A_3 = \begin{vmatrix} 4 & 6 \\ 6 & 9 \end{vmatrix} - 2\begin{vmatrix} 2 & 6 \\ 3 & 9 \end{vmatrix} + 3\begin{vmatrix} 2 & 4 \\ 3 & 6 \end{vmatrix}$

$= 0 - 2(0) + 3(0)$

$= 0$

Step-3

For any $n \ge 2$ we can note that

$A_n = \begin{pmatrix} 1 & 2 & 3 \ldots n \\ 2 & 4 & 6 \ldots 2n \\ n & 2n & 3n \ldots n^2 \end{pmatrix}$

And clearly any two rows of A_n are proportional and hence $\det A_n = 0$

Thus if a_{ij} is I times j, then $\det A = 0$

(exception when A=[1])