AQA – Proof – A2 Further Mathematics P1

1. June/2021/Paper_7367/1/No.5

The matrix **M** is defined by $\mathbf{M} = \begin{bmatrix} 3 & 2 & -2 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Prove by induction that $\mathbf{M}^n = \begin{bmatrix} 3^n & 3^n - 1 & -3^n + 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ for all integers $n \geq 1$

[5 marks]