



**Proof By Induction (Matrices) Exam Questions (Edexcel)**

**Q1.**

Prove by induction, that for  $n \in \mathbb{Z}^+$ ,

$$\begin{pmatrix} 3 & 0 \\ 6 & 1 \end{pmatrix}^n = \begin{pmatrix} 3^n & 0 \\ 3(3^n - 1) & 1 \end{pmatrix},$$

(6)

(Total 6 marks)

(Q07 6667/01, June 2011)

**Q2.**

Prove by induction that, for  $n \in \mathbb{Z}^+$ ,

$$\begin{pmatrix} 3 & -2 \\ 2 & -1 \end{pmatrix}^n = \begin{pmatrix} 2n+1 & -2n \\ 2n & 1-2n \end{pmatrix}$$

(7)

(Total 7 marks)

(Q08 6667/01, June 2009)

**Q3.**

Prove by induction that, for  $n \in \mathbb{Z}^+$ .

$$\begin{pmatrix} 1 & 0 \\ -1 & 5 \end{pmatrix}^n = \begin{pmatrix} 1 & 0 \\ -\frac{1}{4}(5^n - 1) & 5^n \end{pmatrix}$$

(6)

(Total for question = 6 marks)

(Q05 6667/01, June 2015)

**Q4.**

Prove by induction that for  $n \in \mathbb{N}$

$$\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}^n = \begin{pmatrix} 1 & -2n \\ 0 & 1 \end{pmatrix}$$

(5)

(Total for question = 5 marks)

(Q04 9FM0/01, June 2023)

**Q5.**

Prove by induction that for  $n \in \mathbb{Z}^+$

$$\begin{pmatrix} 5 & -8 \\ 2 & -3 \end{pmatrix}^n = \begin{pmatrix} 4n+1 & -8n \\ 2n & 1-4n \end{pmatrix}$$

(6)

(Total for question = 6 marks)

(Q08 8FM0/01, June 2018)