Homework 6 Solutions

1) $S = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} = [\vec{0}\ \vec{e}_1\ \vec{e}_2\ \vec{e}_3\ \vec{e}_4]$

$S^2 = S[\vec{0}\ \vec{e}_1\ \vec{e}_2\ \vec{e}_3\ \vec{e}_4] = [\vec{0}\ \vec{0}\ \vec{e}_1\ \vec{e}_2\ \vec{e}_3] = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

$S^3 = S^2[\vec{0}\ \vec{e}_1\ \vec{e}_2\ \vec{e}_3\ \vec{e}_4] = [\vec{0}\ \vec{0}\ \vec{0}\ \vec{e}_1\ \vec{e}_2] = \begin{bmatrix} 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

$S^4 = S^3[\vec{0}\ \vec{e}_1\ \vec{e}_2\ \vec{e}_3\ \vec{e}_4] = [\vec{0}\ \vec{0}\ \vec{0}\ \vec{0}\ \vec{e}_1] = \begin{bmatrix} 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

$S^5 = S^4[\vec{0}\ \vec{e}_1\ \vec{e}_2\ \vec{e}_3\ \vec{e}_4] = O_{5\times 5}$, the zero matrix

$S^K = S^5$ for any number ≥ 5.

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2) $AB = \begin{bmatrix} 1[3 & -8] + 2[2 & 3] \\ 3[3 & -8] + 6[2 & 3] \end{bmatrix} = \begin{bmatrix} 7 & -2 \\ 21 & -6 \end{bmatrix}$

$AC = \begin{bmatrix} 1[5 & 2] + 2[1 & -2] \\ 3[5 & 2] + 6[1 & -2] \end{bmatrix} = \begin{bmatrix} 7 & -2 \\ 21 & -6 \end{bmatrix}$

$AB = AC$ but $B \neq C$