University of Technology Sydney
Department of Mathematical and Physical Sciences

37233 Linear Algebra
Tutorial Assignment 5

Question 1.

For matrix $\mathbf{A}$ calculate $\mathbf{A^2}$, $\mathbf{A^3}$ and $\mathbf{A^4}$

$$\mathbf{A} = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix}.$$

Question 2.

For matrix $\mathbf{A}$ calculate $\mathbf{A^2}$, $\mathbf{A^3}$ and $\mathbf{A^4}$.

$$\mathbf{A} = \begin{pmatrix} \lambda_1 & 1 & 0 & 0 \\ 0 & \lambda_1 & 1 & 0 \\ 0 & 0 & \lambda_1 & 0 \\ 0 & 0 & 0 & \lambda_2 \end{pmatrix}.$$

Question 3.

Find the **LDU** decomposition for the matrix

$$\mathbf{A} = \begin{pmatrix} 1 & 2 & -1 \\ -2 & -5 & 3 \\ -1 & -3 & 0 \end{pmatrix}.$$

Question 4.

Find the inverses of the following matrices

$$\mathbf{A} = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 2 & 0 \\ 0 & 3 & 0 & 0 \\ 4 & 0 & 0 & 0 \end{pmatrix}, \qquad \mathbf{B} = \begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix} \qquad \mathbf{C} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & -2 & 1 \end{pmatrix} \qquad \mathbf{D} = \begin{pmatrix} -4 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

.../Over

Question 5.

Do the following vectors Span R^3

$$\mathbf{v_1} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}, \qquad \mathbf{v_2} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, \qquad \mathbf{v_3} = \begin{pmatrix} 1 \\ 4 \\ -2 \end{pmatrix}, \qquad \mathbf{v_4} = \begin{pmatrix} 2 \\ 3 \\ 2 \end{pmatrix}.$$