

Q₁) Reduce the linear differential

equation:

$$y^{(4)} + 2ty''' + t^2y'' + t^3y' + t^4y = e^{3t}$$

Q₂) Show that

$$u_1(t) = \begin{bmatrix} e^t \\ 0 \\ e^t \end{bmatrix}, u_2(t) = \begin{bmatrix} 3e^t \\ 2e^t \\ e^t \end{bmatrix}, u_3(t) = \begin{bmatrix} e^{2t} \\ 2t \\ 3e^t \\ 2t \\ e \end{bmatrix}$$

the vectors u_1, u_2 and u_3 are linearly indep.
linearly independent

Q₃) Solve the system $\vec{y}' = A\vec{y}$, $y(0) = \eta$

where

$$A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}, y(0) = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$$