

F15 Homework 4

Linear Algebra, Dave Bayer

[1] Find A^n where A is the matrix

$$A = \begin{bmatrix} -3 & -1 \\ 2 & 0 \end{bmatrix}$$

[2] Find e^{At} where A is the matrix

$$A = \begin{bmatrix} -2 & -3 \\ 1 & 2 \end{bmatrix}$$

[3] Solve the differential equation $y' = Ay$ where

$$A = \begin{bmatrix} 1 & -3 \\ 1 & -3 \end{bmatrix}, \quad y(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

[4] Find e^{At} where A is the matrix

$$A = \begin{bmatrix} 5 & -4 \\ 1 & 1 \end{bmatrix}$$

[5] Find e^{At} where A is the matrix

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

[6] Find e^{At} where A is the matrix

$$A = \begin{bmatrix} 0 & 2 & 1 \\ 0 & 2 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

[7] Solve the differential equation $y' = Ay$ where

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

[8] Solve the differential equation $y' = Ay$ where

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

[9] Express the quadratic form

$$3x^2 + 3y^2 + 2xz + 2yz + 2z^2$$

as a sum of squares of orthogonal linear forms.