

**F14 Practice 4**

Linear Algebra, Dave Bayer

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[9] Express the quadratic form

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

as a sum of squares of orthogonal linear forms.