

Applied Linear Algebra 2018 Fall

1. A linear problem $Ax = b$ are given as

$$A = \begin{pmatrix} 1 & 2 & 3 \\ -1 & 1 & 0 \\ 1 & 0 & 2 \end{pmatrix}, \quad b = \begin{pmatrix} 4 \\ -1 \\ 2 \end{pmatrix}$$

- (a) Use Gaussian elimination and solve the system.
(b) Compute determinant of A using any method you want.
2. Project $(2, 1, 0) \in \mathbb{R}^3$ onto a subspace spanned by $\{(1, 1, 1), (0, 1, 1)\}$.
3. A matrix A is given as

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

Find an invertible matrix Q and corresponding diagonal matrix D that satisfy $A = QDQ^{-1}$.