

Practice Problems S5

1. Compute $P^{-1}AP$ and then A^n if $A = \begin{bmatrix} 6 & -5 \\ 2 & -1 \end{bmatrix}$ and $P = \begin{bmatrix} 5 & 1 \\ 2 & 1 \end{bmatrix}$
2. (Diagonalization) Find the characteristic polynomial, eigenvalues and an invertible matrix P such that $P^{-1}AP$ is a diagonal matrix if $A = \begin{bmatrix} 3 & 1 & 1 \\ -4 & -2 & -5 \\ 2 & 2 & 5 \end{bmatrix}$.
3. Determine whether the following matrices are diagonalizable or not:
(a) $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$; (b) $B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$; (c) $C = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 2 \\ 0 & 0 & 2 \end{bmatrix}$.
4. Solve the following linear recurrences:
(a) $x_{k+2} = 2x_k - x_{k+1}$, where $x_0 = 1$ and $x_1 = 2$;
(b) $x_{k+3} = -2x_k + x_{k+1} + 2x_{k+2}$, where $x_0 = 1$ and $x_1 = 2 = x_2$.