1 Powers of Matrices

• In last week’s homework, the population matrix \( P = \begin{bmatrix} 0.95 & 0.03 \\ 0.05 & 0.97 \end{bmatrix} \)
was used to determine the population change between a city and it’s
suburbs at yearly increments \( k \), for an initial population vector
\( x_0 = \begin{bmatrix} 600K \\ 400K \end{bmatrix} \).

- What is the difference in the first time step when \( k = 1 \), i.e. \( d_1 = x_0 - x_1 \)?
- Does the difference \( d \) become smaller as time steps \( k \) increase, i.e. \( d_k = x_{k-1} - x_k \)?
- Do you think the population will reach a steady state, i.e. \( d_k \approx 0 \) for large \( k \)?

2 Sums in MATLAB

• Use the function \( S = \text{sum}(A, \text{dim}) \) on the matrix \( A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \).

- What happens when \( \text{dim} = 1 \)?
- What happens when \( \text{dim} = 2 \)?
- What happens when you use \( \text{sum}(A, \text{dim}) \) on the matrix created by the MATLAB command \( \text{magic}(n) \)?