Assignment for Section 1.3: Matrices

(1) For $\boldsymbol{s}_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, $\boldsymbol{s}_2 = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$ and $\boldsymbol{s}_3 = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, find the linear combination

$$\boldsymbol{b} = 3\boldsymbol{s}_1 + 4\boldsymbol{s}_2 + 5\boldsymbol{s}_3.$$

Then let $\boldsymbol{s}_1, \boldsymbol{s}_2, \boldsymbol{s}_2$ go into the column the the matrix S.

(a) With $3, 4, 5$ in $\boldsymbol{x}$, compute the dot product of each row of S with $\boldsymbol{x}$.

(b) Write $\boldsymbol{b}$ as a matrix-vector multiplication $S\boldsymbol{x}$.

(2) Find the four components x_1, x_2, x_3, x_4 of the 4 by 4 difference equation

$$A\boldsymbol{x} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & -1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{bmatrix} = \boldsymbol{b}.$$

Then write this solution as $\boldsymbol{x} = A^{-1}\boldsymbol{b}$ to find the inverse matrix A^{-1}.

Please submit a hard copy of

- the **assignments for Section 1.1, Section 1.2 and Section 1.3**

at the beginning of class on **21st, October**. Make sure

(1) your **name, student ID and major** are written on the first page, and
(2) the papers are stapled together.