LOTI.05.019 Data Analysis and Computational Methods with MATLAB
Second Practical Session

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1. Question 1

Create a row vector that has the following elements: $\sqrt{15} \times 10^3$, $\frac{25}{14-6^2}$, $\frac{\ln 35}{0.4^3}$, $\frac{\sin 65^\circ}{\cos 80^\circ}$, 129 and $\cos^2\left(\frac{\pi}{20}\right)$.

2. Question 2

Create the following row vectors:

$$\boldsymbol{a} = \begin{bmatrix} 3 & 9 & -0.5 & 3.6 & 1.5 & -0.8 & 4 \end{bmatrix} \qquad \boldsymbol{b} = \begin{bmatrix} 12 & -0.8 & 6 & 2 & 5 & 3 & -7.4 \end{bmatrix} \tag{1}$$

(a) Use the two vectors in a MATLAB command to create a 3×4 matrix such that the first row consists of elements 3 through 6 of vector $\boldsymbol{a}$, the second row consists of elements 4 through 7 of vector $\boldsymbol{a}$, and the third row consists of elements 2 through 5 of vector $\boldsymbol{b}$.

(b) Use the two vectors in a MATLAB command to create a 6×2 matrix such that the first column consists of elements 2 through 7 of vector $\boldsymbol{a}$, and the second column consists of elements 1 through 3 and 5 through 7 of vector $\boldsymbol{b}$.

3. Question 3

Create the following matrix:

$$\boldsymbol{H} = \begin{bmatrix} 1.25 & 1.5 & 1.75 & 2 & 2.25 & 2.5 & 2.75 \\ 1 & 2 & 3 & 1 & 2 & 3 & 4 \\ 45 & 40 & 35 & 30 & 25 & 20 & 15 \end{bmatrix} \tag{2}$$

(a) Create a 2×5 matrix $\boldsymbol{G}$ such that its first row includes the first three elements and the last two elements of the first row of $\boldsymbol{H}$, and the second row of $\boldsymbol{G}$ includes the last five elements of the third row of $\boldsymbol{H}$.

(b) Create a 4×3 matrix $\boldsymbol{K}$ such that the first, second, third, and fourth rows are the second, third, fifth and seventh columns of matrix $\boldsymbol{H}$.

4. Question 4

Using the `zeros`, `ones`, and `eye` commands, create the following arrays by typing one command:

$$(a)\begin{bmatrix}1 & 1 & 0 & 0\\ 1 & 1 & 0 & 0\end{bmatrix} \qquad (b)\begin{bmatrix}1 & 0 & 0 & 0 & 1 & 1\\ 0 & 1 & 0 & 0 & 1 & 1\end{bmatrix} \qquad (c)\begin{bmatrix}1 & 1 & 1 & 1\\ 0 & 0 & 0 & 0\\ 0 & 0 & 0 & 0\end{bmatrix} \tag{3}$$