

Solutions of Practice Exercises
Preparatory Course
M.Sc. in ISFM

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Exercise 1: You should get:

$$\mathbf{AB} = \begin{bmatrix} -12 & 8 & -1 \\ -5 & 7 & -7 \\ 1 & 19 & -11 \end{bmatrix}$$

$$\mathbf{BA} = \begin{bmatrix} 4 & 10 & 11 \\ -10 & -10 & -6 \\ 1 & 6 & -10 \end{bmatrix}$$

$$\mathbf{A}^T - \mathbf{B} = \begin{bmatrix} 1 & 0 & -3 \\ 5 & -3 & 6 \\ -5 & -2 & 4 \end{bmatrix}$$

$$3\mathbf{A} + \mathbf{B}^T = \begin{bmatrix} 3 & 7 & -3 \\ -8 & 7 & -2 \\ 3 & 10 & 8 \end{bmatrix}$$

$$\mathbf{A}^T \mathbf{B} = \begin{bmatrix} 4 & -10 & 7 \\ 10 & 2 & 3 \\ 11 & 3 & -7 \end{bmatrix}$$

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$$\mathbf{B}^T \mathbf{A} = \begin{bmatrix} 4 & 10 & 11 \\ -10 & 2 & 3 \\ 7 & 3 & -7 \end{bmatrix}$$

Exersice 2: Answers are

[a] \mathbf{A}^2 does not exist

$$[b] \mathbf{B}^3 = \begin{bmatrix} 0 & 0 & -4 \\ 2 & -1 & -2 \\ 0 & 0 & 8 \end{bmatrix}$$

$$[c] (\mathbf{AC})^2 = \begin{bmatrix} 3 & -1 \\ -2 & 2 \end{bmatrix}$$

$$[d] (\mathbf{BA}^T)^T = \begin{bmatrix} 0 & 3 & 0 \\ -1 & -1 & 2 \end{bmatrix}$$

$$[e] \mathbf{CC}^T - \mathbf{B} = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 6 & -1 \\ 0 & -1 & -1 \end{bmatrix}$$

$$[f] (\mathbf{AB})(\mathbf{AB})^T = \begin{bmatrix} 6 & -7 \\ -7 & 9 \end{bmatrix}$$

Exersice 3: The reduced form of $\begin{bmatrix} 3 & 1 \\ 12 & 4 \end{bmatrix}$ is $\begin{bmatrix} 1 & 1/3 \\ 0 & 0 \end{bmatrix}$. The reduced

form of $\begin{bmatrix} 2 & 0 & -4 \\ 1 & -2 & -2 \\ 1 & 1 & -2 \\ 3 & 1 & 1 \end{bmatrix}$ is $\begin{bmatrix} 1 & 0 & -2 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$.

Exercises 4–7: Please refer to the accompanying excel file.