Roll No:

Date:

Formative assessment 1
ME-781, Aug 1, 2023

Max Marks: 10, Total time: 15 minutes

- No explanation for any question would be provided.
- Please make any assumptions as you see fit and solve the questions.
- This is an open-notes exam.
- You need not derive anything from scratch if it was derived in the class.
- You are not allowed to use a computer or calculator.

1.) Given that:

$$A = \begin{bmatrix} 1 & 8 & 3 \\ 5 & 1 & 9 \\ 2 & 4 & 5 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Perform the following matrix multiplications:

2.0 *i.)* *AxB*

$$\begin{matrix} 54 & 66 & 78 \\ (72 & 87 & 102) \\ 53 & 64 & 75 \end{matrix}$$

2.0 *ii.)* *BxA*

$$\begin{matrix} 17 & 22 & 36 \\ (41 & 61 & 87\ ) \\ 65 & 100 & 138 \end{matrix}$$

Do the column vectors in the following matrix (as defined above) form a basis?

2.0 *iii.)* *B*

No, as the determinant of B is 0.

2.0 iv.) *AxB* and *BxA*

No, as the determinant of B is 0.

2.) Find a transformation matrix *A* so that a linear mapping $\Phi: \mathbb{R}^2 \rightarrow \mathbb{R}^3$ is given by

2.0

$$\Phi\left(\begin{bmatrix} x1 \\ x2 \\ x3 \end{bmatrix}\right) = \begin{bmatrix} 3X1 + 5X3 \\ x1 + x2 - x3 \\ 7x1 - 2x2 + x3 \end{bmatrix}$$

$$\begin{matrix} 3 & 0 & 5 \\ (1 & 1 & -1) \\ 7 & -2 & 1 \end{matrix}$$