

**HW2B. Written Homework 2B.****Due Week 2 Friday 11:59PM****Name:**

**Instructions:** Upload a pdf of your submission to **Gradescope**. This worksheet is worth 20 points: up to 8 points will be awarded for accuracy of certain parts (to be determined after the due date) and up to 12 points will be awarded for completion of parts not graded by accuracy.

(1) Solve the following matrix equations.

(a) Let  $\mathbf{Ax} = \mathbf{b}$  be a matrix equation with  $\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$  and  $\mathbf{b} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$ .

(b) Let  $\mathbf{Mx} = \mathbf{y}$  be a matrix equation with  $\mathbf{M} = \begin{pmatrix} 1 & 2 \\ -3 & -4 \end{pmatrix}$  and  $\mathbf{y} = \begin{pmatrix} 10 \\ 10 \end{pmatrix}$ .

(c) Let  $\mathbf{RSx} = \mathbf{b}$  be a matrix equation with  $\mathbf{R} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ ,  $\mathbf{S} = \begin{pmatrix} -1 & -2 \\ -3 & -4 \end{pmatrix}$  and  $\mathbf{b} = \begin{pmatrix} 10 \\ 6 \end{pmatrix}$ .

(2) Let  $\mathbf{A} = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{pmatrix}$  and  $\mathbf{B} = \begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & -2 & 1 \\ 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & 1 \end{pmatrix}$ .

(a) Evaluate  $\mathbf{AB}$ .

(b) Solve the system  $\mathbf{Ax} = \begin{pmatrix} 1 \\ 2 \\ 3 \\ 4 \end{pmatrix}$ .

(c) Solve the system  $\mathbf{Bx} = \begin{pmatrix} 4 \\ 3 \\ 2 \\ 1 \end{pmatrix}$ .

(3) For the given matrix, do the specified row operations on the matrix  $\mathbf{A} = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{pmatrix}$ .

Observe that these matrix operations are **not** supposed to be done in succession.

(a)  $R_1 + R_2 + R_3 + R_4 \mapsto R_1$

(b)  $R_1 + R_2 + R_3 + R_4 \mapsto R_2$

(c)  $R_4 \leftrightarrow R_1$

(d)  $5R_2 \mapsto R_2$