

Updated September 2, 2026

Homework problems for AMAT 220 (Linear Algebra), Fall 2026. Over the course of the semester I'll add each week's homework set to this pdf, with each due date specified. Each problem is worth 2 points.

---

Homework set #1 (five problems) (due Weds 9/2).

Problem 1.1: Write down the augmented matrix encoding the system of linear equations

$$\begin{aligned}2x - 3y + 5z &= 7 \\ x - z &= 1\end{aligned}$$

Problem 1.2: Starting with the matrix  $\begin{pmatrix} 0 & 3 & -4 & 8 \\ -1 & -1 & 2 & -4 \end{pmatrix}$ , write down the matrix obtained from the elementary row operation that replaces the first row with itself plus 2 times the second row.

Problem 1.3: Explain in words why the system of linear equations

$$\begin{aligned}x + y &= 2 \\ x - y &= 0 \\ x + 3y &= 5\end{aligned}$$

has no solutions. (It's fine to not use matrices.)

Problem 1.4: Exactly one of the following three statements is true, and the other two are false. Figure out which, explain why it's true, and explain why the other two are false.

- (1) The equations  $x + y + z = 0$  and  $2x + 2y + 2z = 0$  have no solutions in common.
- (2) The equations  $x + y + z = 0$  and  $2x + 2y + 2z = 0$  have exactly one solution in common.
- (3) The equations  $x + y + z = 0$  and  $2x + 2y + 2z = 0$  have infinitely many solutions in common.

Problem 1.5: Is the matrix  $\begin{pmatrix} 1 & 0 & 0 & 8 & 3 \\ 0 & 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$  in reduced row echelon form or not? Justify your answer.

---

No class Labor Day 9/7

---

Homework set #2 (five problems) (due Weds 9/9).

Problem 2.1: Use the official row reduction algorithm to put the matrix  $\begin{pmatrix} 0 & 1 & -1 & 2 \\ 1 & 0 & -3 & 0 \\ 2 & -2 & 1 & 1 \end{pmatrix}$  in reduced row echelon form.

Problem 2.2: Use the official algorithm to find all solutions to the system of linear equations

$$\begin{aligned}y - z + 2w &= 2 \\x - 3z &= 1 \\2x - 2y + z + w &= 3\end{aligned}$$

Problem 2.3: Determine whether or not the system of linear equations

$$\begin{aligned}y - z &= 2 \\x - 3z &= 1 \\2x - 2y - 4z &= 0\end{aligned}$$

is consistent. Justify your answer.

Problem 2.4: Rewrite the vector equation  $x \begin{pmatrix} 1 \\ 2 \\ 2 \end{pmatrix} + y \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix} + z \begin{pmatrix} 0 \\ 1 \\ -2 \end{pmatrix} = \begin{pmatrix} 2 \\ 3 \\ -1 \end{pmatrix}$  as a system of linear equations.

Problem 2.5: Find all solutions to the vector equation in Problem 2.4.