

HW1

* If new to matlab, go to assignment web site and follow link to matlab tutorial and HWO. You do not have to hand in a HWO solution.

* ① Is $(3, 4, -2)$ a solution to the system below?

$$\begin{aligned}5x - y + 2z &= 7 \\ -2x + 6y + 9z &= 0 \\ -7x + 5y - 3z &= -7\end{aligned}$$

② Solve the augmented system

$$\left(\begin{array}{ccc|c} 1 & -3 & 0 & 7 \\ 0 & 1 & 5 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{array} \right)$$

Does the system have a solution, an infinite number of solutions, or no solution?

③ Determine whether the system is consistent:

$$\begin{aligned}x_1 - 2x_3 &= -1 \\ x_2 - x_4 &= 2 \\ -3x_2 + 2x_3 &= 0 \\ -4x_1 + 7x_4 &= -5\end{aligned}$$

- ④ For the following system determine the value of the constant k , that makes the system consistent:

$$\left(\begin{array}{cc|c} 1 & k & -2 \\ -4 & 2 & 10 \end{array} \right)$$

- ⑤ Row reduce (put in row echelon form)

(a) $\left[\begin{array}{cccc} 1 & 4 & 7 & 10 \\ 2 & 5 & 8 & 11 \\ 3 & 6 & 9 & 12 \end{array} \right]$

(b) $\left[\begin{array}{ccccc} 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 \end{array} \right]$

- ⑥ Find the general solutions to

(a) $\left[\begin{array}{ccc|c} 1 & -3 & 0 & -5 \\ -3 & 7 & 0 & 9 \end{array} \right]$

(c) $\left[\begin{array}{ccccc|c} 1 & 5 & 0 & 0 & 1 & 3 \\ 0 & 0 & 1 & 0 & 1 & -2 \\ 0 & 0 & 0 & 1 & 1 & 6 \\ 0 & 0 & 0 & 0 & 1 & 1 \end{array} \right]$

(b) $\left[\begin{array}{cc|c} 1 & 2 & -7 \\ -1 & -1 & 1 \\ 2 & 1 & 5 \end{array} \right]$

- ⑦ Suppose that a 3×5 augmented matrix whose fifth column is a pivot column. Is the system consistent? why?

⑧ Write a system of equations that is equivalent to

$$x_1 \begin{bmatrix} 3 \\ -2 \\ 8 \end{bmatrix} + x_2 \begin{bmatrix} 5 \\ 0 \\ 9 \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \\ 8 \end{bmatrix}$$

⑨ Let $\hat{a}_1 = \begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}$, $\hat{a}_2 = \begin{bmatrix} -5 \\ -8 \\ 2 \end{bmatrix}$ and $\underline{b} = \begin{bmatrix} 3 \\ -5 \\ h \end{bmatrix}$

for what values of h is $\underline{b}$ in the plane spanned by $\hat{a}_1$ and $\hat{a}_2$?

⑩ Let $A = \begin{bmatrix} 2 & 0 & 6 \\ -1 & 8 & 5 \\ 1 & -2 & 1 \end{bmatrix}$ let $\underline{b} = \begin{bmatrix} 10 \\ 3 \\ 7 \end{bmatrix}$

and let W be the set of combinations of the columns of A .

(a) Is $\underline{b}$ in W ?

(b) Show that the second column of A is in W .

⑪ Construct a 3×3 matrix A , with nonzero entries and a vector $\underline{b}$ in $\mathbb{R}^3$ such that $\underline{b}$ is not in the set spanned by the columns of A .