Solve with Us (Week 3)

Machine Learning Foundations
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Question No. 1

For the given matrix,

$$A = \begin{bmatrix} 4 & 2 & 1 & 3 \\ 6 & 3 & 4 & 7 \\ 2 & 1 & 0 & 1 \end{bmatrix}$$

What is the rank of the matrix?

Question no. 2

Consider the matrices $X_{4 \times 3}$, $Y_{4 \times 3}$ and $P_{2 \times 3}$.

The order of $[P(X^T Y)^{-1} P^T]^T$ will be ?

Question no. 3

The dimension of null space of the matrix A is?

$$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & -1 & 0 \\ -1 & 0 & -1 \end{bmatrix}$$

Question no. 4

If the vectors $v_1 = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$, $v_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$ and $v_3 = \begin{bmatrix} -2 \\ 0 \\ 1 \end{bmatrix}$

form an orthogonal basis of the 3-D real space R^3,

then the vector $u = \begin{bmatrix} 4 \\ 3 \\ -3 \end{bmatrix}$ can be expressed as?

Question no. 5

If matrix $A_{7 \times 9}$ has rank 5, then the dimension of its row space, column space, null space and left null space respectively, are?

Question no. 6

Imagine it's a clear day and the Sun is shining down upon the Earth.

Assume the vector $\vec{v} = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$ is the ground and the vector $\vec{u} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ is a

stick with one endpoint on the ground and one endpoint in the air. If

the shadow of the stick is cast onto the ground, find the length of the
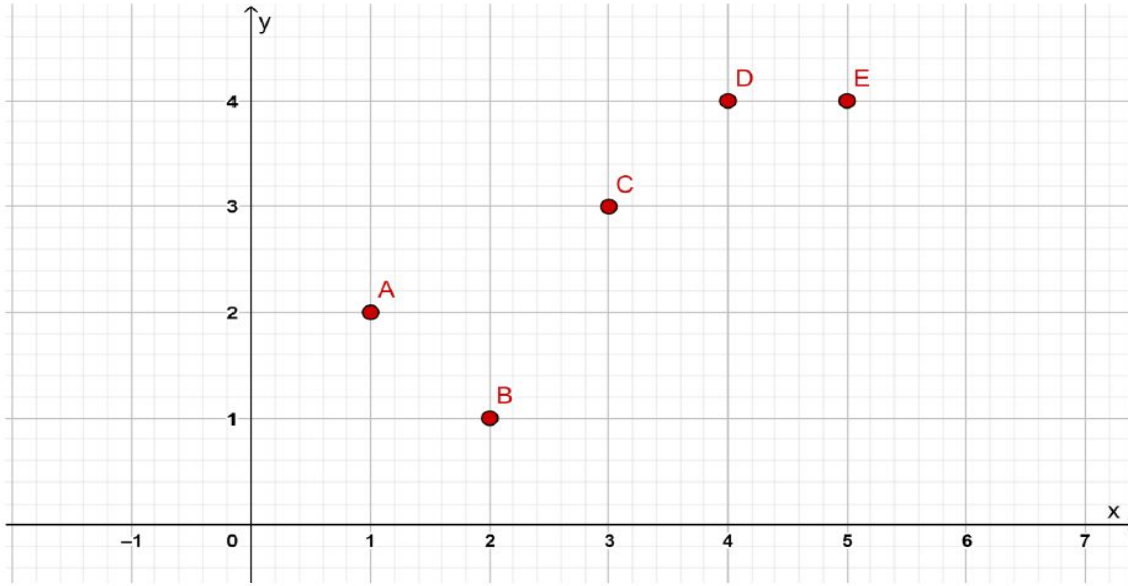
shadow.

Question no. 7

Find the projection matrix for $a = \begin{bmatrix} -1 \\ 3 \\ -2 \\ 1 \end{bmatrix}$ and use it to obtain the

projection of $b = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 1 \end{bmatrix}$ onto a and compute the length of error vector, e.
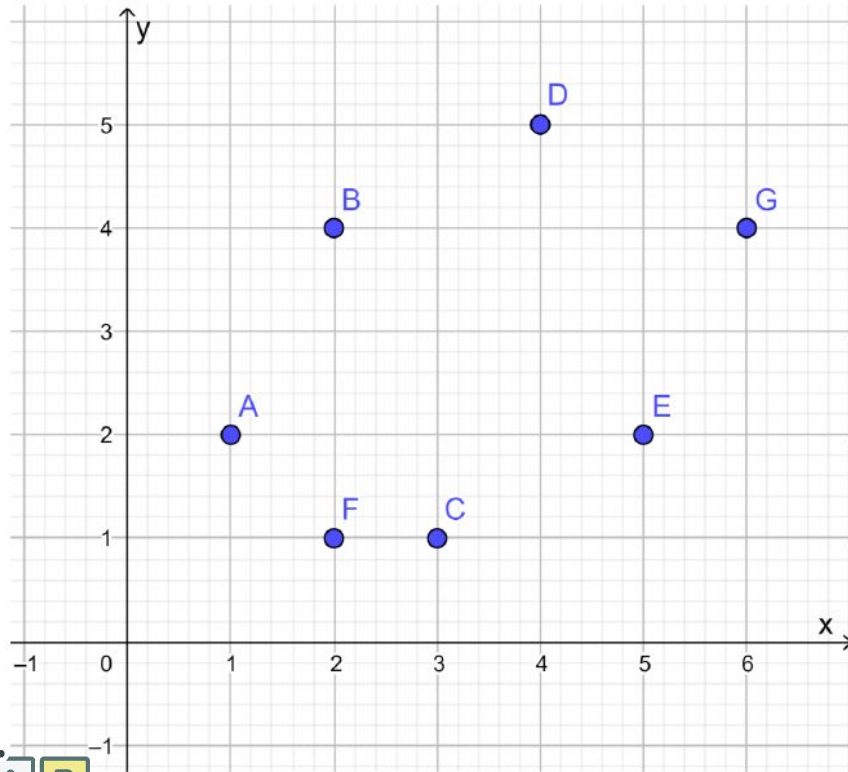
Question no. 8

Find the best fit line for the given dataset using least square method.

Question no. 9

Consider two lines:

(a) A line with zero slope and y-intercept of 2.5.

(b) A line with zero slope and y-intercept of 3.5.

Which of these lines give the minimal error to fit the data points?

How was the session?

THANK YOU!!!!