

Midterm Examples

1. We have products N_1 and N_2 . The products are made up as follows: $N_1 = (R_1, R_1, R_2, R_3, R_3)$ and $N_2 = (R_1, R_2, R_2, R_3)$. Using the same notation as in MML Example 2.1 answer the following questions.

(a) $\Sigma(a_{ij}) =$

- (b) In the system

$$a_{11}x_1 + a_{12}x_2 = b_1$$

$$a_{21}x_1 + a_{22}x_2 = b_2$$

$$a_{31}x_1 + a_{32}x_2 = b_3$$

Explain what x_1 and b_3 are.

2. Show an example that proves that matrix multiplication is not commutative.
3. Let M be a matrix with ij entry equal to c_{ij} . If N is a matrix such that its ij entry is c_{ji} , what is the relationship between M and N ?
4. Is it possible to multiply any two matrices? Explain.
5. Represent the following problem as a system of linear equations, a system of vector equations and as a matrix equation: An event sold 80 tickets and got a revenue. There were three seat types at prices \$1, \$2, and \$3. The revenue was R .
6. Is the set of 2×2 real matrices with the operation of addition a vector space?
7. Is the Iris dataset features used in class a vector space? If yes, what is the dimension of that space?. If not, explain how it is related to a vector space.
8. Are the vectors $\langle 1, 0 \rangle$, $\langle 1, 1 \rangle$ and $\langle 1, 3 \rangle$ linearly independent?