1. Let
$$A = \begin{bmatrix} A_1 & A_2 & \cdots & A_n \end{bmatrix}$$
 and $B = \begin{bmatrix} B_1 \\ B_2 \\ \vdots \\ B_n \end{bmatrix}$, where A_i and B_i are used to denote the columns

and rows of the matrices A and B respectively. Use the fact that the columns of C are linear combinations of columns of A to show that the product C = AB can be written as the sum of outer products as follows.

$$C = \sum_{i=1}^{n} A_i B_i$$

$$(C) = \beta_{12}A + \beta_{12}A - \beta_{13}A$$

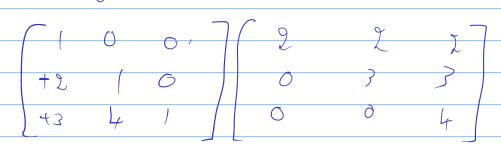
$$= \frac{1}{2} \left(\frac{1}{2} \right) \left(\frac$$

2. Using the fact that the columns of AB are linear combination of columns of A , show
Let $A_i - A_i$ indicate colors of $AB)_i^T = B^T A^T$ Let $(AB)_i$ indicate it color
(AB) = B. A + B. An
$((A\hat{R})_i)^T = B_{ii}A_{i}^T + B_{2i}A_{2}^T + C - C - C - C - C - C - C - C - C - C$
Here ATAT A Tare hours verlors. Bir Bzi, Scales the queur in a preparation maner
So the ith thew of (AB) is linear comb of A? - Ant, social by Bii Ant, William is taking scaling factors from 137. (AB) T. BTAT
(AB) T. BTAT

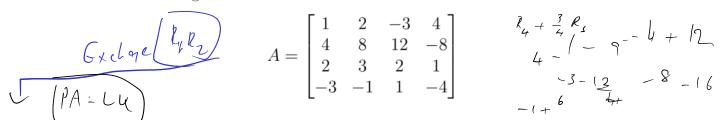
3. Without partial pivoting, find the LU decomposition for the following matrix A

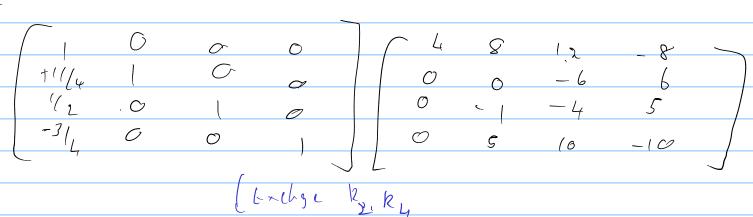
$$A = \begin{bmatrix} 2 & 2 & 2 \\ 4 & 7 & 7 \\ 6 & 18 & 22 \end{bmatrix}$$

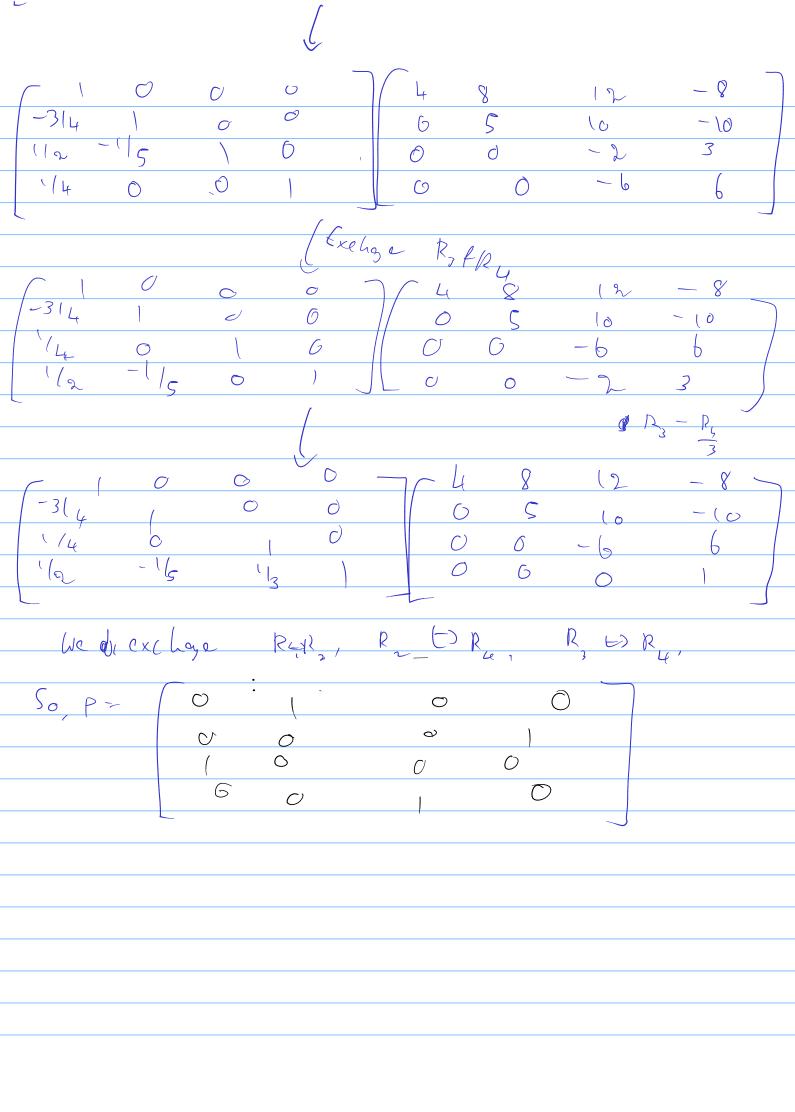
U decomposition

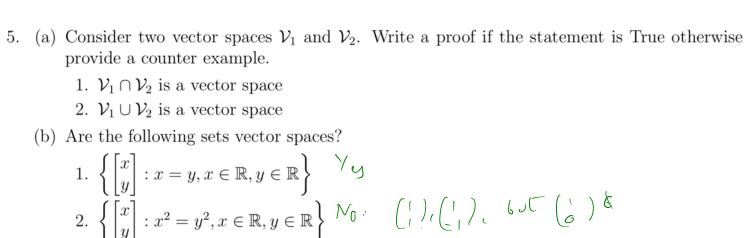


4. For an LU decomposition with partial pivoting, find all the permutation and lower triangular matrices for the following matrix.









$$2. \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : x^{2} = y^{2}, x \in \mathbb{R}, y \in \mathbb{R} \right\} \qquad \left(\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1$$

E) | Let Xy EV | NV2.

= 7 xy CV | , x, y EV 2

= 7 ax + by E V | , ax + by EV 2 (Linear, ty in L 2 V 2)

= 7 ax + by C V | NV2

= 7 The

2.
$$V_{1} = \begin{bmatrix} 9 \\ 0 \end{bmatrix}$$
, $Q \in \mathbb{C}$, $V_{2} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ Let $Q =$

