

HW 1: due Friday 9/18 12:00 - 3:00 Tomorrow, Th 9/17 Office Hours: in this from Time: Row reduction LU decomposition Let A he a matrix with . all pivois nonzero we can back substitution · no row swaps need to he done when Pour reducing A = LU where Lis bour triangular of I's or aiagral, U is upper triangular of nonero diagnal

An upper triangular matrix is a matrix such that $\frac{Ex}{3} \rightarrow \begin{pmatrix} 0 & 1 & 3 \\ 0 & 0 & 2 \\ 0 & 0 & 2 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}$ hot
decomp all entires below the diagonal are $\begin{pmatrix} x \times x \\ 0 \times x \end{pmatrix}$ is upper triangular (w). " = 0 i. ! A marrix is lower triangular if about the diagnal are 0.

A matrix is lower triangular of all critics

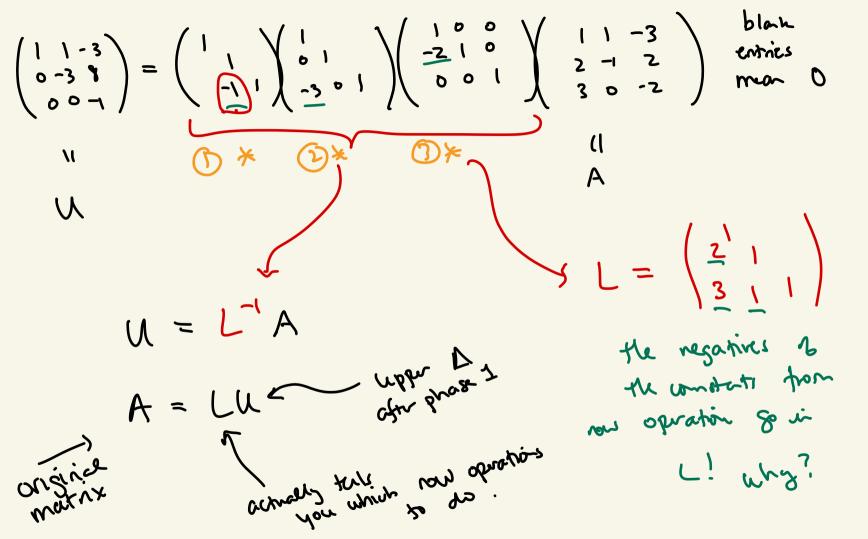
A matrix is lower triangular of all critics

(L) is = 0 is i

How do we compute

$$A = LU^{2}$$

 $\begin{pmatrix} 1 & 1 & -3 \\ 2 & -1 & 2 \\ 3 & 0 & -2 \end{pmatrix} = \begin{pmatrix} -2r_1 + r_2 \\ 7 & regular \\ 3 & 0 & -2 \end{pmatrix}$ for A=W all you med elimination phak of the (downsweep) now reduction? -863+65 backsubshtution 353 75 Circ a matrix A, the U is girst the resulting after doing the GE on

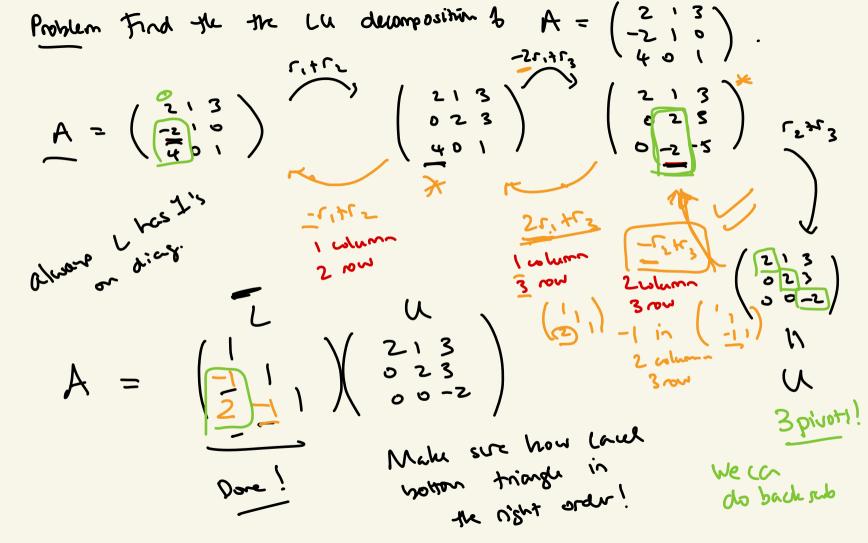


$$A = \begin{pmatrix} \frac{1}{2} & \frac{1}{3} & \frac{1}{3}$$

A = L W

Crum an elementary matrix corresponding to
$$\Gamma_2' = -2\Gamma_1 + \Gamma_2 \quad \longleftrightarrow \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

(-21) -1 cover the row operation! 12 = 25,75 $\begin{pmatrix} 3 & 0 & -2 \\ 5 & -1 & 5 \\ 1 & 1 & -3 \\ 2 & -2 & 2 \end{pmatrix} \xrightarrow{\Sigma_1 = -5 \\ 1 & 1 & -3 \\ 2 & -3 & 2 \end{pmatrix}$ This is why in (21) = (-21) entries crette to row reduce Lactually encodes how bacherons & A.



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$$\frac{-3^{3}+8^{2}=-7}{+8^{2}-1} \longrightarrow \frac{-3^{3}=-5}{+8^{2}-1} \longrightarrow \frac{3^{3}=-5}{+8^{2}-1} \longrightarrow \frac{3}{+8^{2}-1} \longrightarrow \frac{3}{+8^{$$

This is fast for a computer

Next rou sucps, permutations is general.

 $\left(\begin{array}{c} x \\ 3 \end{array}\right) = \left(\begin{array}{c} 1/3 \\ 1/3 \end{array}\right)$

compared to doing 5 oth nu ops.