% back bubitithion

$$\chi(u) = \delta(u) / \alpha(u, u);$$

$$S = S + a(i,j) * x(j);$$

 $S = S + a(i,j) * x(j);$
 $x(i) = (b(i) - S) / a(i,i);$

2

Operation count (reduction to upper

$$\frac{34}{4} \text{ divitions} = \sum_{k=1}^{h-1} (h-4) = \sum_{k=1}^{h-1} 4 = \frac{h(h-1)}{2}$$

$$\frac{4}{4} \text{ divitions} = \sum_{k=1}^{h-1} (h-4)^2 = \sum_{k=1}^{h-1} 4^2 = S$$

$$\frac{(h-1)^3}{2} = (h-1)^3 - (h-2)^3 + (h-2)^3 + \dots -2^3 + 2^3 - 1^3 + 1^3 = S$$

$$= \sum_{k=1}^{h-1} (4^3 - (4-1)^3) = \sum_{k=1}^{h-1} (4^3 - (4^3 - 34^2 + 34 - 1)) = S$$

$$= 3 \sum_{k=1}^{h-1} 4^2 - 3 \sum_{k=1}^{h-1} 4 + \sum_{k=1}^{h-1} 4$$

$$= 3 \sum_{k=1}^{h-1} 4^2 - 3 \sum_{k=1}^{h-1} 4 + \sum_{k=1}^{h-1} 4$$

$$= 3 \sum_{k=1}^{h-1} 4^2 - 3 \sum_{k=1}^{h-1} 4 + \sum_{k=1}^{h-1} 4$$

$$= 3 \sum_{k=1}^{h-1} 4^2 - 3 \sum_{k=1}^{h-1} 4 + \sum_{k=1}^{h-1} 4$$

=> (h-1) 3 = 3S - 3 n(h-1) + (h-1)

S = n(n-1) (24-1)

Solve for S.

Note the leading proter in operation count in Gaussian elimination is $\frac{n}{3}$.

Form matrix

The effect

matrix at step t. Let A(k) be the reduced of performing step to is · FR A (E) A (1c+1)

lower triangular

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upper triaugular matrix whore Then 4x-6 is reduced to $4^{(u)}x-6^{(u)}$

 $f^{(n)} = E_{n-1} \dots E_{2} E_{1} A$: upper $f^{(n)} = E_{n-1} \dots E_{2} E_{1} \delta$

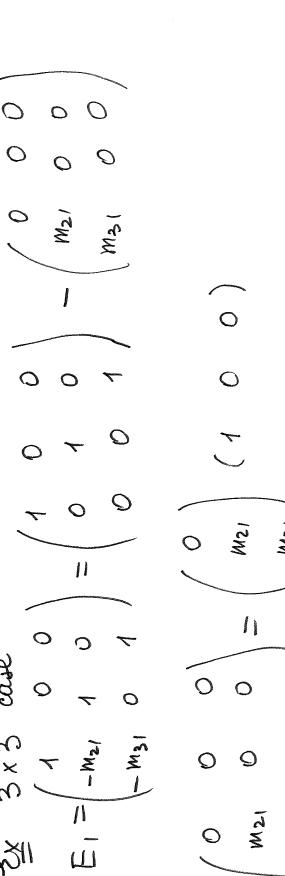
LV factorization

En. 1 ... F2E, A = U: upper triangular matrit

 $\begin{pmatrix} a_{kk}^{(k)} \neq 0 \end{pmatrix}$ $= \Gamma - m_k e^{+}$

4

$$m_{k+1}$$
, k
 m_{k+1} , k
 m_{k+1} , k
 m_{k}
 m_{k}



9

ž Ž

$$A = (E_{n-1} ... E_2 E_1) U$$
 $A = E_1' E_2' ... E_{n-1}' U$

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2. E' Ez' = I + m, et + m2 ez

E' Ez' = (I+m,e,)(I+m,e,) = I+m,e,+ m,e,+ m,e,+ m,e,m,e,T Proof

0 M 32 $e_1^T m_2 = (40...0) / 0$

X 33 Z.Z v v 11 12 1

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3.
$$E_1' = E_2' = m_{2'} + m_{2'}$$

Solve Ax= 8 application

O(43) | AX= & 2. Solve Ly = 6 for y / triangular 1. Find LIV mode that A=LU

 $k = X\Omega$ 0(22) (2n)O

4x = LUx = Ly = 4

Solve Ux=y for x)

ean solve for many vectors & while steps 2 and 3. advantage If you solve for Land U, they you

Strage

Instead of storing Land U, you can overwrite A with roduced A, i.e. T, and entries of L:

triangularization