Sure, here's an example of how to use LU factorization to solve a system of linear equations:

Suppose we have the following system of linear equations:

x + 2y + 3z = 6

4x + 5y + 6z = 15

7x + 8y + 10z = 28

We can rewrite this system in matrix form as Ax = b, where:

A = [1 2 3;

4 5 6;

7 8 10]

x = [x;

y;

z]

b = [6;

15;

28]

To solve this system using LU factorization, we first factorize the matrix A into its lower triangular matrix L and upper triangular matrix U such that A = LU. To do this, we can use Gaussian elimination with partial pivoting.

After applying Gaussian elimination with partial pivoting, we get:

L = [1 0 0;

0 1 0;

0.57 0.32 1]

U = [7 8 10;

0 -1.14 -2.43;

0 0 0.18]

Now we can solve the system by first solving Ly = b for y using forward substitution, and then solving Ux = y for x using backward substitution.

Solving Ly = b for y using forward substitution:

y1 = b1 = 6

y2 = b2 - L(2,1)y1 = 15 - 4(6) = -9

y3 = b3 - L(3,1)y1 - L(3,2)y2 = 28 - 7(6) - 8(-9) = 2

So we have y = [6; -9; 2].

Now we can solve Ux = y for x using backward substitution:

z = y3/U(3,3) = 2/0.18 = 11.11

y2 = (y2 - U(2,3)z)/U(2,2) = (-9 + 2.43(11.11))/(-1.14) = 7.05

x = (y1 - U(1,2)y2 - U(1,3)z)/U(1,1) = (6 - 8(7.05) - 10(11.11))/7 = -2.33

So we have x = -2.33, y = 7.05, and z = 11.11 as the solution to the system of linear equations.