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Assignment

LU Decomposition (Doolittle method)

```
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clc;
clear;
```

Part 1 (Preprocessing)

```
A = [2  -1  3   2;
     2   2  0   4;
     1   1 -2   2;
     1   3  4  -1];
```

Part 2 (Implementing)

```
function [L, U] = LU(A)
    n = size(A,1);
    L = eye(n);
    U = A;
    for i = 1:n-1
        for j = i+1:n
            m = U(j,i)/U(i,i);           % multiplier
            L(j,i) = m;                  % store multiplier in L
            U(j,:) = U(j,:) - m*U(i,:);  % eliminate in U
        end
    end
end
```

```
L =

    1.0000         0         0         0
    1.0000    1.0000         0         0
    0.5000    0.5000    1.0000         0
    0.5000    1.1667   -3.0000    1.0000


U =
```

```
    2.0000   -1.0000    3.0000    2.0000
         0    3.0000   -3.0000    2.0000
         0         0   -2.0000         0
         0         0         0   -4.3333

L matrix:
    1.0000         0         0         0
    1.0000    1.0000         0         0
    0.5000    0.5000    1.0000         0
    0.5000    1.1667   -3.0000    1.0000

U matrix:
    2.0000   -1.0000    3.0000    2.0000
         0    3.0000   -3.0000    2.0000
         0         0   -2.0000         0
         0         0         0   -4.3333

A matrix:
     2    -1     3     2
     2     2     0     4
     1     1    -2     2
     1     3     4    -1
```

Part 3 (Post Processing)

```
[L, U] = LU(A)
fprintf('L matrix:\n')
disp(L)

fprintf('U matrix:\n')
disp(U)

fprintf('A matrix:\n')
disp(round(L * U, 1))
```

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