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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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