

```
clc; clear;
```

Aufgabe1

```
A = [3 0 0 0;  
     0 3 0 0;  
     0 0 3 0;  
     0 0 0 3]; %% Matrix A define  
v = [1; 2; 3; 4]; %% column vector v define  
a = v' * v
```

```
a =  
    30
```

```
B = v * v'
```

```
B = 4x4  
     1     2     3     4  
     2     4     6     8  
     3     6     9    12  
     4     8    12    16
```

```
C = A * B
```

```
C = 4x4  
     3     6     9    12  
     6    12    18    24  
     9    18    27    36  
    12    24    36    48
```

```
lambda_C = eig(C)
```

```
lambda_C = 4x1  
 -0.0000000000000002  
  0.0000000000000000  
  0.0000000000000004  
 90.0000000000000000
```

Aufgabe 2

```
A = rand(1, 1000); %% the method to create random number: rand, randi  
if A(1) >= 0.5  
    fprintf('a1 >= 0.5 \n');  
else  
    fprintf('a1 < 0.5 \n');  
end
```

```
a1 < 0.5
```

```
n05 = 0;  
for a = 1: 1000  
    if A(a) >= 0.5  
        n05 = n05 + 1;  
    end
```

```

    a = a + 1;
end
fprintf("n05 = %d \n", n05);

```

n05 = 519

```

i = 1;
while (i <= 1000)
    if A(i) >= 0.499 && A(i) <= 0.501
        fprintf("index is %d, value is %f \n", i, A(i));
        break;
    else
        i = i + 1;
    end
    if i==1000
        fprintf("Kein Element 0.499 <= a_i <= 0.501 \n");
    end
end
end

```

index is 121, value is 0.500940

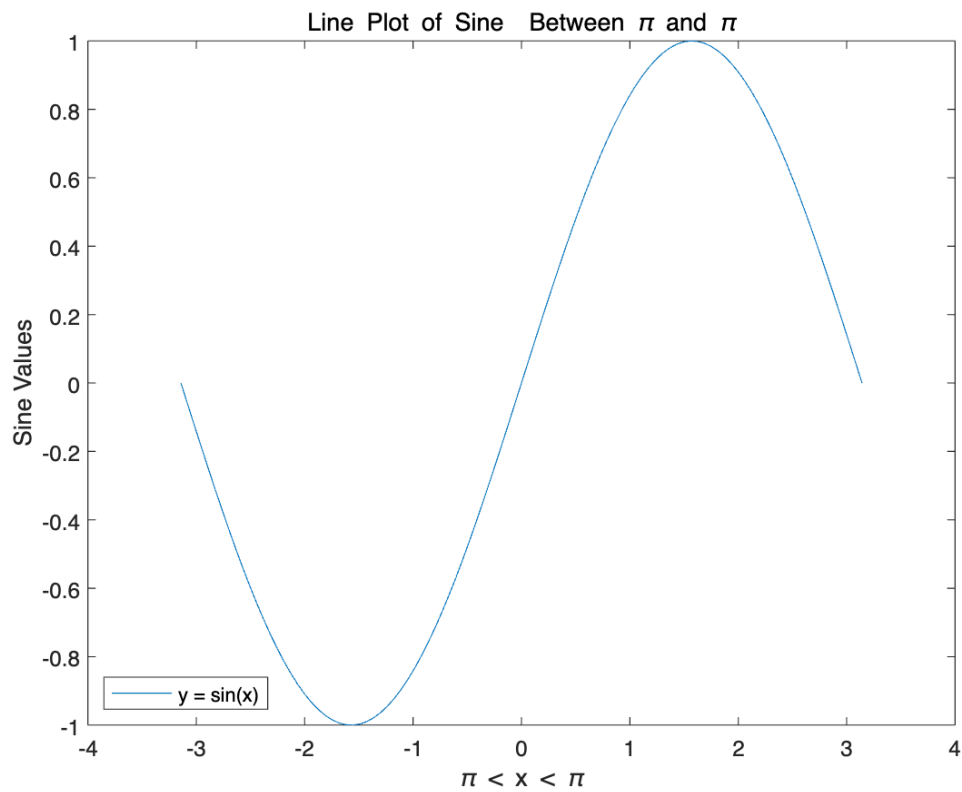
Aufgabe 3

3.1 2D-Plot

```

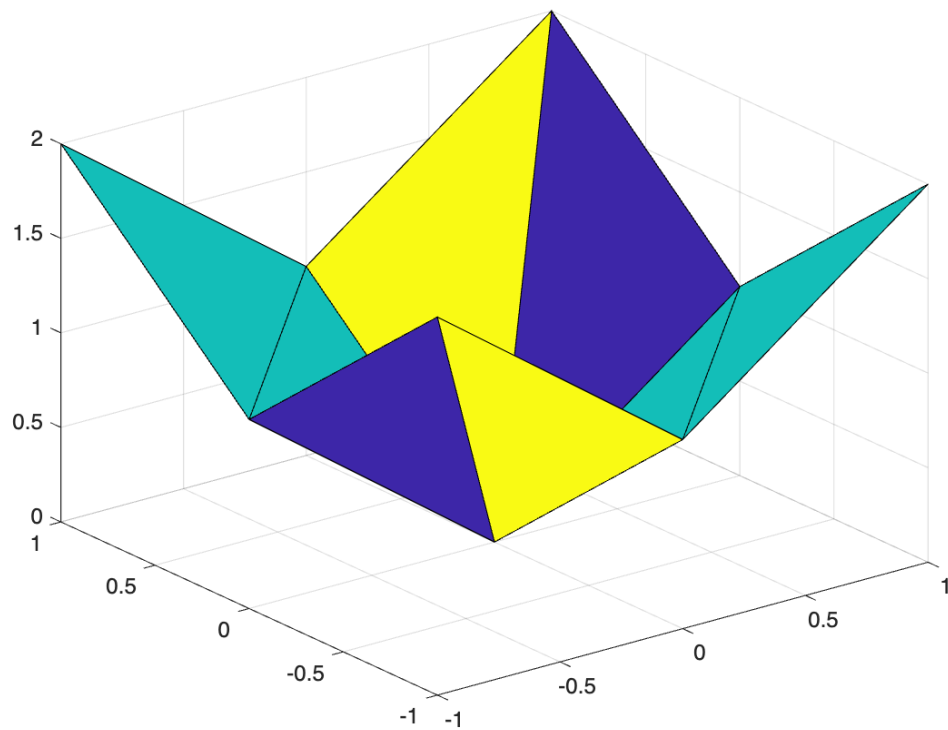
%3.1
% syms x
% f = @(x)sin(x);
% x = linspace(-pi, pi, 100);
% plot(x, f(x))
x = linspace(-pi, pi, 100);
y = sin(x);
figure
plot(x, y)
title('Line Plot of Sine Between \pi and \pi')
xlabel ('\pi < x < \pi')
ylabel ('Sine Values')
legend({'y = sin(x)'}, 'Location', 'southwest')

```



3.2 3D-plot

```
nodes = [-1, -1; 0, -1; 1, -1; -1, 0; 0, 0; 1, 0; -1, 1; 0, 1; 1, 1];
el ements = [
    1, 2, 5, 4;
    2, 3, 6, 5;
    4, 5, 8, 7;
    5, 6, 9, 8];
sol = [2; 1; 2; 1; 0; 1; 2; 1; 2];
fkt0(nodes, el ements, sol )
grid on
```



Fakultaet

```
x = fakul taet(3)
```

```
x =  
    6
```

```
function a = fakul taet(n)  
    a = factori al (n);  
end
```

Modul test

```
% Defi ne a tol erance  
tol = 1e-12;  
% test function : facul taet  
modul test(fakul taet(0), 1)
```

```
test passed
```

```
modul test(fakul taet(5), 120)
```

```
test passed
```

```
function fkt0(nodes, el ements, sol )  
x = nodes(:, 1);
```

```
y = nodes(:, 2);  
T = [elements(:, 1:3); elements(:, 3:4), elements(:, 1)];  
trisurf(T, x, y, sol);  
end
```