VECTORS AND ARRAYS

Ex 1. Definition of vectors

```
v1 = 2.^[0:10]
```

```
v1 = 1×11
           1           2           4           8          16          32 ···
```

```
v2 = cos (pi ./ [1:10])'
```

```
v2 = 10×1
          -1
  6.1232e-17
         0.5
     0.70711
     0.80902
     0.86603
     0.90097
     0.92388
     0.93969
     0.95106
```

```
format short g, v3 = 0.1 .* 2 .^ [0:-1:-5]
```

```
v3 = 1×6
         0.1        0.05       0.025      0.0125     0.00625    0.003125
```

Ex 2. Definition of array B

```
b = [1:7; 9:-2:-3; 2.^(2:8)]
```

```
b = 3×7
     1     2     3     4     5     6     7
     9     7     5     3     1    -1    -3
     4     8    16    32    64   128   256
```

Ex 3.

```
%Sum 5 and 7 columns of B
b * [0 0 0 0 1 0 1]'
```

```
ans = 3×1
    12
    -2
   320
```

```
%Last row of B
[0 0 1] * b
```

```
ans = 1×7
     4     8    16    32    64   128   256
```

```
%Swap 2nd and 3rd rows of B
```

```
[1 0 0; 0 0 1; 0 1 0] * b
```

```
ans = 3×7
     1     2     3     4     5     6     7
     4     8    16    32    64   128   256
     9     7     5     3     1    -1    -3
```

PLOTS

Ex 1. Use of '@' and 'inline' commands to define and evaluate a function

```
x=[0:3];
% definition with @
f1=@(x) x.*sin(x)+(1/2).^(sqrt(x));
f1(x)
```

```
ans = 1×4
             1       1.3415       2.1938      0.72438
```

```
% definition with 'inline'
f1_in = inline('x.*sin(x)+(1/2).^(sqrt(x))','x');
f1_in(x)
```

```
ans = 1×4
             1       1.3415       2.1938      0.72438
```

```

% the same cna be done for f2
f2=@(x) x.^4+log(x.^3+1);
f2(x)
```

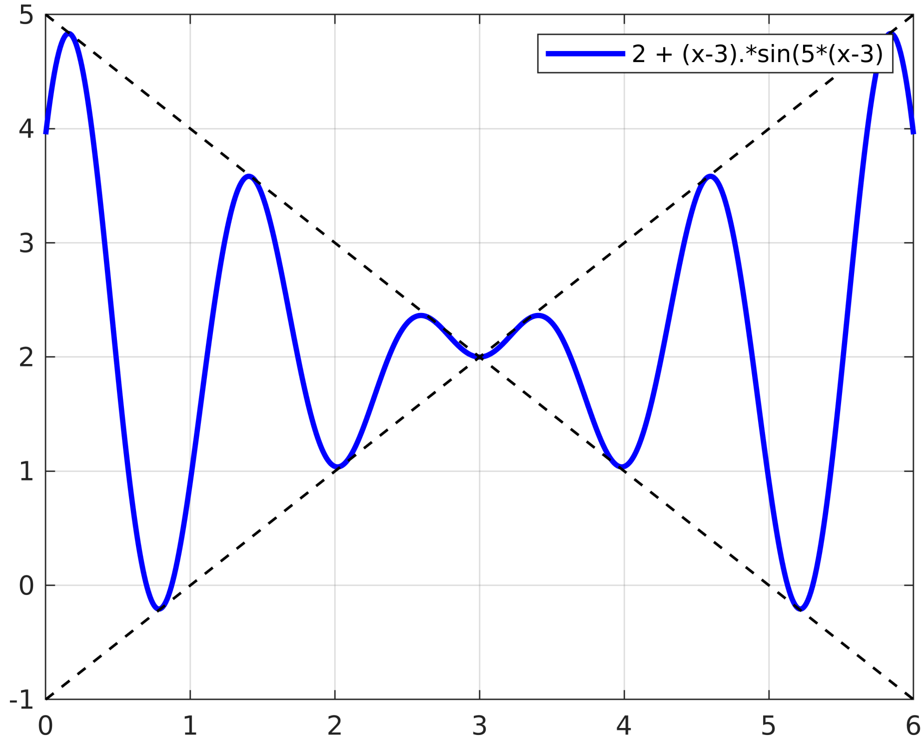
```
ans = 1×4
             0       1.6931       18.197       84.332
```

```
f2_in = inline('x.^4+log(x.^3+1)','x');
f2_in(x)
```

```
ans = 1×4
             0       1.6931       18.197       84.332
```

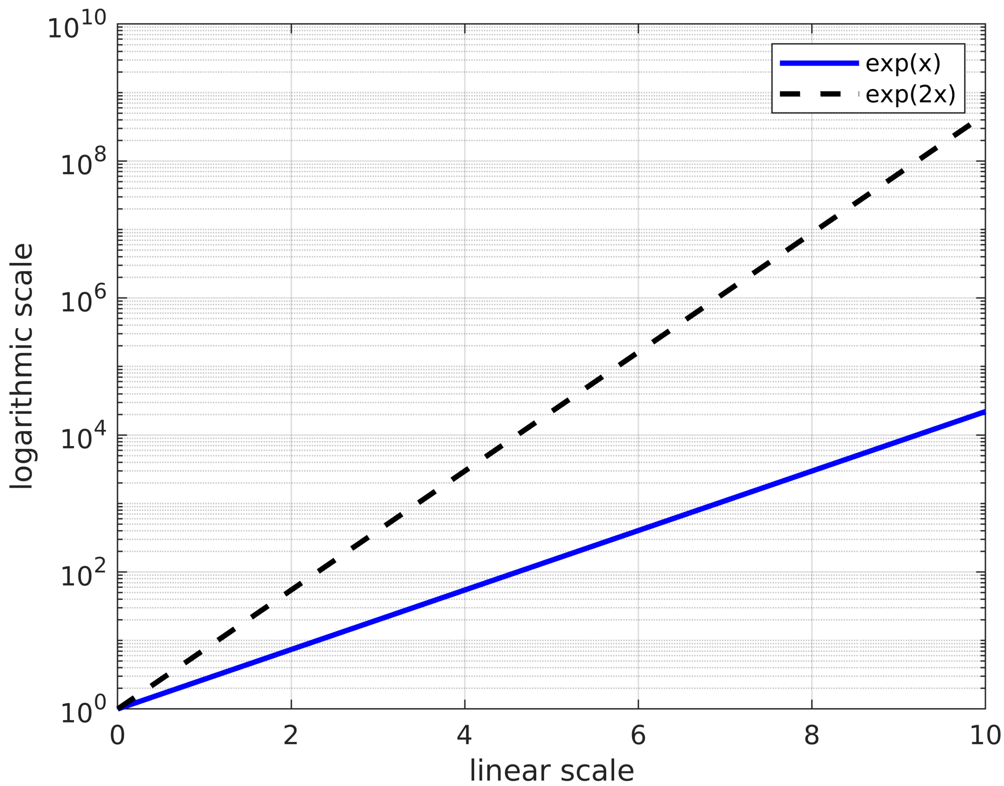
Ex 2. Plot different curves in the same figure

```
x = [0:0.01:6];
f = @(x) 2 + (x-3).*sin(5*(x-3));
plot(x,f(x),'Linewidth',2,'Color','b')
hold on; grid on;
g = @(x) -x +5;
h = @(x) x - 1;
plot(x,g(x),'LineWidth',1,'LineStyle','--','Color','k')
plot(x,h(x),'LineWidth',1,'LineStyle','--','Color','k')
legend('2 + (x-3).*sin(5*(x-3)');
```



Ex 3. Plot functions using the logarthmic scale

```
x = [0:0.01:10];
f = @(x) exp(x);
g = @(x) exp(2*x);
figure;
semilogy(x,f(x),'Linewidth',2,'Color','b')
hold on; grid on;
semilogy(x,g(x),'LineWidth',2,'LineStyle','--','Color','k')
legend('exp(x)','exp(2x)');
xlabel('linear scale');
ylabel('logarithmic scale');
```



SCRIPTS AND LOOPS

Ex 1. Double for loop for the definition of the HIlbert matrix

```
a = zeros(5);
for i = 1 : 5
    for j = 1 : 5
        a(i,j) = 1/(i+j-1);
    end
end
disp(a)
```

```
          1         0.5     0.33333        0.25         0.2
        0.5     0.33333        0.25         0.2     0.16667
    0.33333        0.25         0.2     0.16667     0.14286
       0.25         0.2     0.16667     0.14286       0.125
        0.2     0.16667     0.14286       0.125     0.11111
```

```
disp([a-hilb(5)])
```

```
     0     0     0     0     0
     0     0     0     0     0
     0     0     0     0     0
     0     0     0     0     0
     0     0     0     0     0
```

Ex 2. Example of while loop

```
year = 0;
deposit = 10000;
deposit_values = deposit;
interest_rate = 1.02;
while (deposit < 1e6)
    year = year + 1;
    deposit = deposit * interest_rate + 10000;
    deposit_values = [deposit_values deposit];
end
disp(year);
```

```
    55
```

Ex 3. An other use of the while loop

```
n=1;
while ( sum([1:n]) < 88 )
   n=n+1;
end
n
```

```
n = 
    13
```

FUNCTIONS AND OUTPUTS

Ex 1. Use of the funtion Is_triangle.m to check whether a triangle is rectangle or not.

```
Is_triangle(3,4,5);
```

```
Yes!
```

Ex 2. Definition of the matrix T using the matrixT.m function

```
T = matrixT(10)
```

```
T = 10×10
     1     0     1     0     1     0     1     0     1     0
     0     1     0     1     0     1     0     1     0     1
     1     0     1     0     1     0     1     0     1     0
     0     1     0     1     0     1     0     1     0     1
     1     0     1     0     1     0     1     0     1     0
     0     1     0     1     0     1     0     1     0     1
     1     0     1     0     1     0     1     0     1     0
     0     1     0     1     0     1     0     1     0     1
     1     0     1     0     1     0     1     0     1     0
```

```
0    1    0    1    0    1    0    1    0    1
```

Ex 3. Definition of a recursive sequence

```
clear; clc;
a(1) = 1;
for ii = 1:10
  a(ii+1) = a(ii)/2 + 1/a(ii);
end
figure;
plot(1:numel(a), a, 'x-b')
hold on,  plot(1:numel(a), sqrt(2)+0*a, 'r--')
grid on
```