

Solution of Laboratory Work 3

Exercise 1 :

```
--> m=10; l=1.3;
--> A=[1 2; 3 4; %e^(-3) m/(1*cos(2*pi/3))]
A =
    1.         2.
    3.         4.
    0.0497871 -15.384615
--> theta=%pi/4; B=[cos(theta) sin(theta) ;
-sin(theta) cos(theta)]
B =
    0.7071068    0.7071068
   -0.7071068    0.7071068
--> A*B
ans =
   -0.7071068    2.1213203
   -0.7071068    4.9497475
    10.913771   -10.843361
--> 1+A
ans =
    2.         3.
    4.         5.
    1.0497871  -14.384615
--> A'
ans =
    1.    3.    0.0497871
    2.    4.   -15.384615
--> A.^3
```

```

ans =
    1.          8.
    27.         64.
    0.0001234  -3641.3291
--> B+eye(B)
ans =
    1.7071068    0.7071068
   -0.7071068    1.7071068
--> X=[A  -A ; zeros(A)  eye(A)]
X =
    1.          2.         -1.         -2.
    3.          4.         -3.         -4.
    0.0497871  -15.384615  -0.0497871   15.384615
    0.          0.          1.          0.
    0.          0.          0.          1.
    0.          0.          0.          0.
--> X([2 3] , 2)
ans =
    4.
   -15.384615
--> X(:, [2 4])=X(:, [4 2])
X =
    1.         -2.         -1.          2.
    3.         -4.         -3.          4.
    0.0497871   15.384615  -0.0497871  -15.384615
    0.          0.          1.          0.
    0.          1.          0.          0.
    0.          0.          0.          0.
--> X( 1 , :)=[ ]
X =
    3.         -4.         -3.          4.
    0.0497871   15.384615  -0.0497871  -15.384615
    0.          0.          1.          0.
    0.          1.          0.          0.
    0.          0.          0.          0.

```

```

--> X=[X( 1 , :) ; [ 1 1 3 4]; X(2 : 4 , : )]
X =
    3.         -4.         -3.         4.
    1.          1.          3.          4.
    0.0497871   15.384615  -0.0497871  -15.384615
    0.          0.          1.          0.
    0.          1.          0.          0.
--> X= inv(B)*[1 ; 1 ]
X =
    0.
    1.4142136

```

Exercise 2 :

```

--> diag(3*ones(4,1),-1) + diag(ones(5,1)) +
diag(2*ones(4,1),1)
ans =
    1.    2.    0.    0.    0.
    3.    1.    2.    0.    0.
    0.    3.    1.    2.    0.
    0.    0.    3.    1.    2.
    0.    0.    0.    3.    1.

```

Exercise 3 :

```

--> A=rand(1,5) , B=diag(A)
A =
    0.2113249    0.7560439    0.0002211    0.3303271
    0.6653811
B =
    0.2113249    0.         0.         0.         0.
    0.         0.7560439    0.         0.         0.
    0.         0.         0.0002211    0.         0.
    0.         0.         0.         0.3303271    0.
    0.         0.         0.         0.         0.6653811

```

```

--> B([1:$],:)=B([$:-1:1],:)
B =
    0.         0.         0.         0.    0.6653811
    0.         0.         0.         0.3303271    0.
    0.         0.         0.0002211    0.         0.
    0.         0.7560439    0.         0.         0.
    0.2113249    0.         0.         0.         0.
--> A=rand(3,4), B=rand(3,4), C=A>B
A =
    0.6283918    0.8782165    0.6623569    0.5442573
    0.8497452    0.068374    0.7263507    0.2320748
    0.685731    0.5608486    0.1985144    0.2312237
B =
    0.2164633    0.3076091    0.312642    0.5664249
    0.8833888    0.9329616    0.3616361    0.4826472
    0.6525135    0.2146008    0.2922267    0.3321719
C =
    T T T F
    F F T F
    T T F F
--> A=rand(5,5), k=find(A>0.5), A(k)=A(k)-1
A =
    0.5935095    0.4051954    0.4148104    0.1121355    0.4062025
    0.5015342    0.9184708    0.2806498    0.6856896    0.4094825
    0.4368588    0.0437334    0.1280058    0.1531217    0.8784126
    0.2693125    0.4818509    0.7783129    0.6970851    0.113836
    0.6325745    0.2639556    0.211903    0.8415518    0.1998338
k =
    1.    2.    5.    7.    14.    17.    19.    20.    23.
A =
   -0.4064905    0.4051954    0.4148104    0.1121355    0.4062025
   -0.4984658   -0.0815292    0.2806498   -0.3143104    0.4094825
    0.4368588    0.0437334    0.1280058    0.1531217   -0.1215874
    0.2693125    0.4818509   -0.2216871   -0.3029149    0.113836
   -0.3674255    0.2639556    0.211903   -0.1584482    0.1998338

```

```

--> A=grand(5,5,"uin",0,10), position=find(A==0)
A =
    6.    7.    2.    5.    6.
    3.    0.    3.    2.    5.
   10.    6.    3.    3.    7.
    9.    5.    8.    2.    8.
    4.    4.    0.    7.    6.

position =
    7.   15.
--> X=[1:10]', norm(X)
X =
    1.
    2.
    3.
    4.
    5.
    6.
    7.
    8.
    9.
   10.

ans =
   19.621417

```

Exercise 4 :

```

--> x=linspace(-4,2,9)
x =
   -4.   -3.25  -2.5  -1.75  -1.   -0.25    0.5    1.25    2.
--> x(1),x(4)
ans =
   -4.
ans =
   -1.75
--> x(0)
Invalid index.

```

```

-> x($)
ans =
    2.
--> length(x)
ans =
    9.
--> x(2:3)
ans =
   -3.25   -2.5
--> x(:)
ans =
   -4.
   -3.25
   -2.5
   -1.75
   -1.
   -0.25
    0.5
    1.25
--> x([1,1])
ans =
   -4.   -4.
--> x([1:length(x)])=x([length(x):-1:1])
x =
    2.    1.25    0.5   -0.25   -1.   -1.75   -2.5   -3.25   -4.

```

$\mathbf{x}(1)$ and $\mathbf{x}(4)$ are respectively the first and the fourth elements of the vector $\mathbf{x}$. The element with index 0, $\mathbf{x}(0)$, does not exist in Scilab (indices in Scilab start from 1). $\mathbf{x}(\$)$ is the last element of the vector $\mathbf{x}$. $\text{length}(\mathbf{x})$ is the length of the vector $\mathbf{x}$. $\mathbf{x}(2:3)$ represents the elements of $\mathbf{x}$ with indices 2 and 3. $\mathbf{x}(:)$ gives the elements of $\mathbf{x}$ as a column vector. $\mathbf{x}([1,1])$ extracts a submatrix containing the two elements with index 1.

Exercise 5 :

```
--> C = [-2, 5, -1, 0, 2, 13, 6, 9, -4, 6, 1, 8, 2, -3, 11]
C =
    -2.    5.   -1.    0.    2.   13.    6.    9.   -4.    6.
    1.    8.    2.   -3.   11.
--> k=find(C > 1 & C < 7)
k =
     2.    5.    7.   10.   13.
--> C(k) = 1
C =
    -2.    1.   -1.    0.    1.   13.    1.    9.   -4.    1.
    1.    8.    1.   -3.   11.
--> [s,k]=gsort( C )
k =
     6.   15.    8.   12.    2.    5.    7.   10.   11.
    13.    4.    3.    1.   14.    9.
s =
    13.   11.    9.    8.    1.    1.    1.    1.    1.    1.
    0.   -1.   -2.   -3.   -4.
--> k2=find(s(1: $-1)==s(2:$))
k2 =
     5.    6.    7.    8.    9.
--> s(k2)=[]
s =
    13.   11.    9.    8.    1.    0.   -1.   -2.   -3.   -4.
--> D=s
D =
    13.   11.    9.    8.    1.    0.   -1.   -2.   -3.   -4.
```