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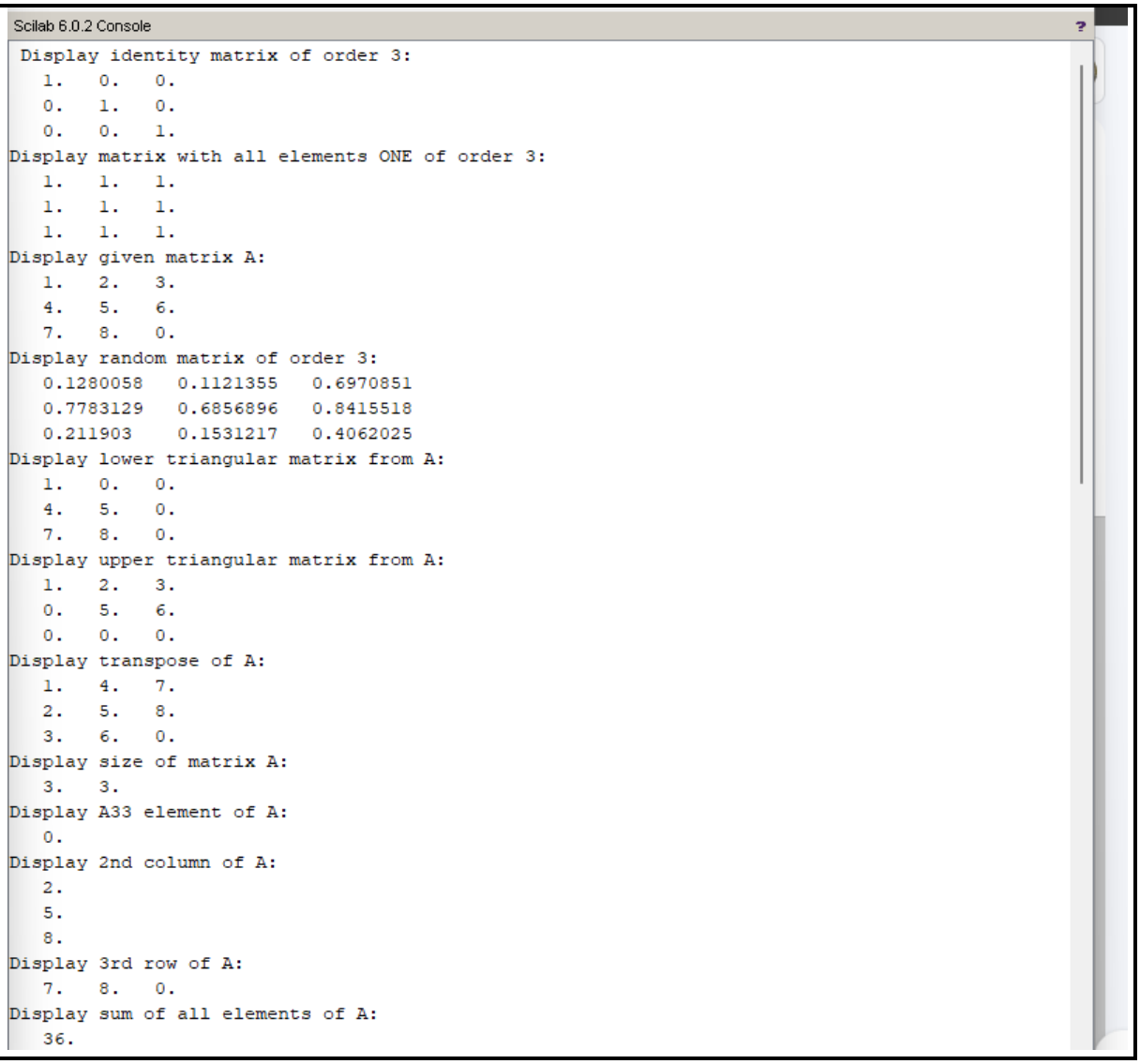
Subject	Linear Algebra
Experiment No.	1
Aim	Implementation of Basic Commands and Operations on Matrix

Code	**1. Basic Scilab Commands:**
	clc;
	
	printf("Display identity matrix of order 3:");
	disp(eye(3,3));
	
	printf("Display matrix with all elements ONE of order 3:");
	disp(ones(3,3));
	
	printf("Display given matrix A:");
	A=[1 2 3;4 5 6;7 8 0]
	disp(A);
	
	printf("Display random matrix of order 3:");
	disp(rand(3,3));
	
	printf("Display lower triangular matrix from A:");
	disp(tril(A));
	
	printf("Display upper triangular matrix from A:");
	disp(triu(A));
	
	printf("Display transpose of A:")
	disp(A');
	
	printf("Display size of matrix A:");
	disp(size(A));

```
printf("Display A33 element of A:");
disp(A(3,3));

printf("Display 2nd column of A:");
disp(A(:,2));

printf("Display 3rd row of A:");
disp(A(3,:));

printf("Display sum of all elements of A:");
disp(sum(A));

printf("Display product of all elements of A:");
disp(prod(A));

printf("Display sum of elements of 2nd column in matrix A:");
disp(sum(A(:,2)));

printf("Display product of elements of 2nd column in matrix A:");
disp(prod(A(:,2)));

printf("Display sum of elements of 3rd row in matrix A:");
disp(sum(A(3,:)));

printf("Display product of elements of 3rd row in matrix A:");
disp(prod(A(3,:)));

printf("Display sum of all columns in order in matrix A:");
disp(sum(A,'r'));

printf("Display product of all columns in order in matrix A:");
disp(prod(A,'r'));

printf("Display sum of all rows in order in matrix A:");
disp(sum(A,'c'));

printf("Display product of all rows in order in matrix A:");
```

```
disp(prod(A,'c'));

printf("Display imaginary part of matrix A:");
disp(imag(A));

printf("Display real part of matrix A:");
disp(real(A));

printf("Display inverse of matrix A:");
disp(inv(A));

printf("Display determinant of matrix A:");
disp(det(A));

printf("Display trace of matrix A:");
disp(trace(A));

printf("Display rank of matrix A:");
disp(rank(A));

printf("Display diagonal matrix A:");
disp(eye(3,3).*A);

printf("Display only diagonal elements of matrix A:");
disp(diag(A));

printf("Display conjugate of matrix A:");
disp(conj(A));
```


Scilab 6.0.2 Console
Display identity matrix of order 3:
1. 0. 0.
0. 1. 0.
0. 0. 1.
Display matrix with all elements ONE of order 3:
1. 1. 1.
1. 1. 1.
1. 1. 1.
Display given matrix A:
1. 2. 3.
4. 5. 6.
7. 8. 0.
Display random matrix of order 3:
0.1280058 0.1121355 0.6970851
0.7783129 0.6856896 0.8415518
0.211903 0.1531217 0.4062025
Display lower triangular matrix from A:
1. 0. 0.
4. 5. 0.
7. 8. 0.
Display upper triangular matrix from A:
1. 2. 3.
0. 5. 6.
0. 0. 0.
Display transpose of A:
1. 4. 7.
2. 5. 8.
3. 6. 0.
Display size of matrix A:
3. 3.
Display A33 element of A:
0.
Display 2nd column of A:
2.
5.
8.
Display 3rd row of A:
7. 8. 0.
Display sum of all elements of A:
36.

Scilab 6.0.2 Console

```
Display product of all elements of A:
   0.
Display sum of elements of 2nd column in matrix A:
   15.
Display product of elements of 2nd column in matrix A:
   80.
Display sum of elements of 3rd row in matrix A:
   15.
Display product of elements of 3rd row in matrix A:
   0.
Display sum of all columns in order in matrix A:
   12.   15.   9.
Display product of all columns in order in matrix A:
   28.   80.   0.
Display sum of all rows in order in matrix A:
   6.
   15.
   15.
Display product of all rows in order in matrix A:
   6.
   120.
   0.
Display imaginary part of matrix A:
   0.   0.   0.
   0.   0.   0.
   0.   0.   0.
Display real part of matrix A:
   1.   2.   3.
   4.   5.   6.
   7.   8.   0.
Display inverse of matrix A:
  -1.7777778   0.8888889  -0.1111111
   1.5555556  -0.7777778   0.2222222
  -0.1111111   0.2222222  -0.1111111
Display determinant of matrix A:
   27.
Display trace of matrix A:
   6.
Display rank of matrix A:
   3.
Display diagonal matrix A:
   1.   0.   0.
   0.   5.   0.
   0.   0.   0.
Display only diagonal elements of matrix A:
   1.
   5.
   0.
Display conjugate of matrix A:
   1.   2.   3.
   4.   5.   6.
   7.   8.   0.

-->
```

2. Exercise:

```
C=rand(4,4);
printf("The random generated matrix C is: ");
disp(C);

sum_first_column = sum(C(:,1));
printf("Sum of first column elements: ");
disp(sum_first_column);

product_second_row = prod(C(2,:));
printf("Product of second row elements: ");
disp(product_second_row);

sum_matrix = sum(C);
printf("Sum of all elements: ");
disp(sum_matrix);

determinant = det(C);
printf("Determinant of Matrix A: ");
disp(determinant);

trace_matrix = trace(C);
printf("Trace of Matrix A: ");
disp(trace_matrix);
```

```
Scilab 6.0.2 Console

--> exec('C:\Users\Admin\Documents\exercise1.sce', -1)
The random generated matrix C is:
   0.8433565   0.1867539   0.2124056   0.9110545
   0.0748595   0.4920584   0.579502    0.8082667
   0.8532815   0.7489608   0.2628148   0.8102653
   0.012459    0.9414957   0.4360987   0.2590428
Sum of first column elements:
   1.7839565
Product of second row elements:
   0.0172533
Sum of all elements:
   8.4326757
Determinant of Matrix A:
   0.0307057
Trace of Matrix A:
   1.8572725

-->
```

3. Code:

```
A=[1 2+%i 4; 3-4*%i 9 -2; 2 -5 1-%i]
disp(A);
printf("Display real part of matrix A:");
disp(real(A));
printf("Display imaginary part of matrix A:");
disp(imag(A));

printf("Display random matrix of order 3 with elements from 0 to 9:")
disp(rand(3,3)*10);

printf("Display random matrix of order 3 with integer elements from 0 to 9:")
disp(int(rand(3,3)*10));

B=[1 3 5; 2 4 1; 1 2 3]
printf("Display matrix B:")
disp(B);

printf("Display reduced row echelon form of B:");
```

```
disp(rref(B));

printf("Display multiplication of A & B: ");
disp(A*B);

printf("Display reciprocal of elements in B: ")
disp(1./B);

printf("Display square root of 25:");
disp(sqrt(25));

printf("Display the sine of pi/2");
disp(sin(%pi/2));

printf("Display the given value of x:");
x= 3^2;
disp(x);

printf("Display reciprocal of given value");
disp(1/x);
```

Output:

```
Scilab 6.0.2 Console

--> exec('C:\Users\Admin\Manish\Prac2\prac2.sce', -1)

   1.          2. + i      4.
   3. - 4.i    9.         -2.
   2.         -5.          1. - i
Display real part of matrix A:
   1.   2.   4.
   3.   9.  -2.
   2.  -5.   1.
Display imaginary part of matrix A:
   0.   1.   0.
  -4.   0.   0.
   0.   0.  -1.
Display random matrix of order 3 with elements from 0 to 9:
   5.7614598   1.2326993   5.7694048
   7.1491304   2.8655522   3.9386961
   9.321636    0.1247996   6.8885837
Display random matrix of order 3 with integer elements from 0 to 9:
   9.   8.   5.
   8.   1.   9.
   3.   5.   9.
Display matrix B:
   1.   3.   5.
   2.   4.   1.
   1.   2.   3.
Display reduced row echelon form of B:
   1.   0.   0.
   0.   1.   0.
   0.   0.   1.
Display multiplication of A & B:
   9. + 2.i     19. + 4.i     19. + i
   19. - 4.i    41. - 12.i    18. - 20.i
  -7. - i      -12. - 2.i     8. - 3.i
Display reciprocal of elements in B:
   1.    0.3333333   0.2
   0.5   0.25        1.
   1.    0.5         0.3333333
Display square root of 25:
   5.
Display the sine of pi/2
   1.
Display the given value of x:
   9.
Display reciprocal of given value
   0.1111111

-->
```

Conclusion	Hence, by completing this experiment I came to know about Implementation of Basic Commands and Operations on Matrix.