Experiment no : 02
Experiment Name : Working with Differentiation, Integration and Matrix in Matlab.

Problem 1 :

Solve a differentiation and an integration problem in Matlab.

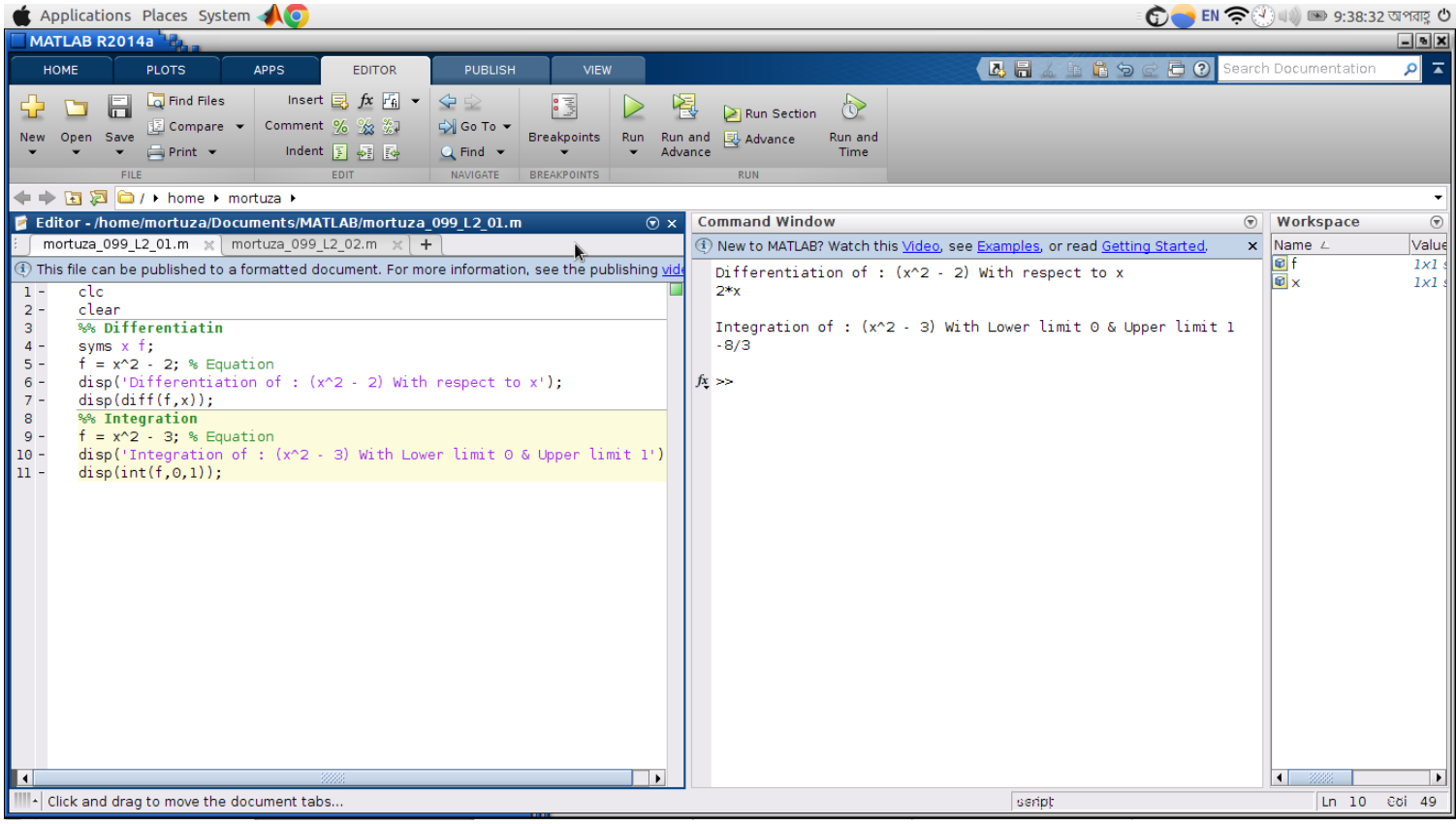
Problem analysis :

i. Declaration of symbolic veritable
ii. Writing the differentiation and integration equation
iii. Use diff() and int() function for differentiation and integration respectively

Coding :

```
clc
clear
%% Differentiation
syms x f;
f = x^2 - 2; % Equation
disp('Differentiation of : (x^2 - 2) With respect to x');
disp(diff(f,x));
%% Integration
f = x^2 - 3; % Equation
disp('Integration of : (x^2 - 3) With Lower limit 0 & Upper limit 1');
disp(int(f,0,1));
```

Output :



Problem 2 :

Manipulation of matrix in Matlab.

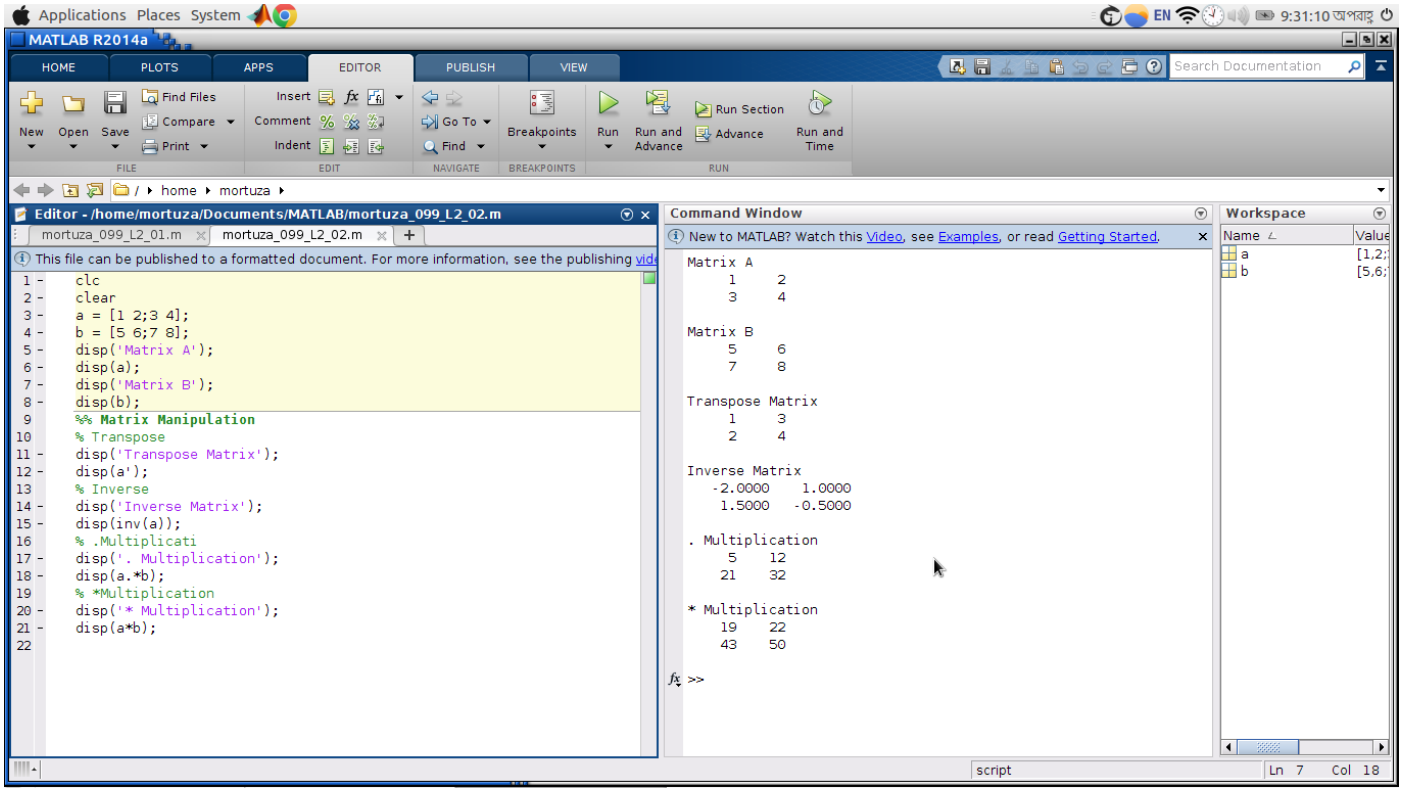
Problem analysis :

i. Declaration of matrix
ii. Display the matrix
iii. Show the transpose of matrix
iv. Show the inverse of matrix
v. Show the . Multiplication of matrix
vi. Show the * multiplication of matrix

Coding :

```
clc
clear
a = [1 2;3 4];
b = [5 6;7 8];
disp('Matrix A');
disp(a);
disp('Matrix B');
disp(b);
% Transpose
disp('Transpose Matrix');
disp(a');
% Inverse
disp('Inverse Matrix');
disp(inv(a));
% .Multiplication
disp('. Multiplication');
disp(a.*b);
% *Multiplication
disp('* Multiplication');
disp(a*b);
```

Output :



Inverse Matrix Step by Step:

$$\begin{pmatrix}1 & 2\\3 & 4\end{pmatrix}^{-1}=\begin{pmatrix}-2 & 1\\\frac{3}{2} & -\frac{1}{2}\end{pmatrix}$$

Steps

$$\begin{pmatrix}1 & 2\\3 & 4\end{pmatrix}^{-1}$$

Find 2x2 matrix inverse according to the formula: $\begin{pmatrix}a & b\\c & d\end{pmatrix}^{-1}=\frac{1}{\det\begin{pmatrix}a & b\\c & d\end{pmatrix}}\begin{pmatrix}d & -b\\-c & a\end{pmatrix}$

$$=\frac{1}{\det\begin{pmatrix}1 & 2\\3 & 4\end{pmatrix}}\begin{pmatrix}4 & -2\\-3 & 1\end{pmatrix}$$

Show Steps

$$\det\begin{pmatrix}1 & 2\\3 & 4\end{pmatrix}=-2$$

$$=\frac{1}{-2}\begin{pmatrix}4 & -2\\-3 & 1\end{pmatrix}$$

Show Steps

$$\frac{1}{-2}\cdot\begin{pmatrix}4 & -2\\-3 & 1\end{pmatrix}=\begin{pmatrix}-2 & 1\\\frac{3}{2} & -\frac{1}{2}\end{pmatrix}$$

$$=\begin{pmatrix}-2 & 1\\\frac{3}{2} & -\frac{1}{2}\end{pmatrix}$$