**MAT1011 – Calculus for Engineers (MATLAB), Fall Semester 2020-2021**

**Digital Assignment SL. 1, Experiment – 1A: Mean value theorem**

**By: Jonathan Rufus Samuel (20BCT0332) Date: 17.12.2020**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Note: Reason for late submission – Ma’am, I had joined classes on the 16th of November and was unaware of the format for submission. Hence I had submitted a handwritten answer for the first 2 assignments, scheduled for submission on the 18th of November. This is the finished copy including the MatLab program for the given question. Thanking You.)

**Q1) Verify mean value theorem for the function f(x) = x^3 - 3\*x^2 + 2\*x + 1 in the interval [-5,8]**

A: Code is as follows:

%Verify mean value theorem for the function f(x) = x^3 - 3\*x^2 + 2\*x + 1

% in the interval [-5,8]

clear

clc

syms x y

f(x) = x^3-3\*x^2+2\*x+1; % Input the function and interval

I=[-5,8];

a=I(1);b=I(2);

Df=diff(f,x);

m=(f(b)-f(a))/(b-a); %Slope of Secant Line

c=solve(Df==m, x);

c=c(a<=c&c<=b);

disp('Values of c lying in the interval I are');

disp(double(c));

T=f(c)+m\*(x-c); %Tangents at x=c

disp('The Tangent Lines at c are');

disp(vpa(y==T,4));

figure

fplot(f,I); grid on; hold on;

fplot(T, I, 'r'); %Tangent Lines

plot(c, double(f(c)), 'ko');

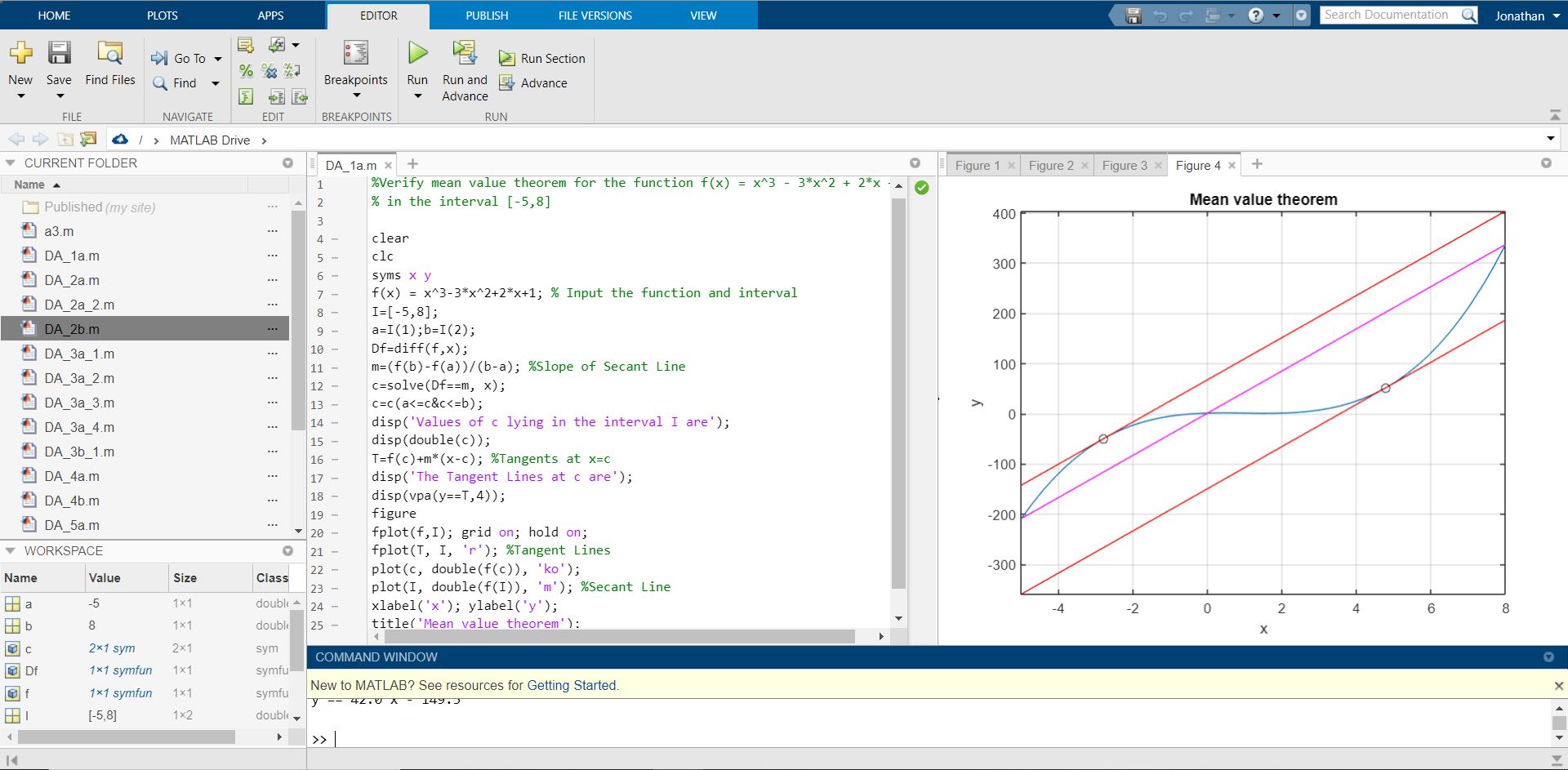
plot(I, double(f(I)), 'm'); %Secant Line

xlabel('x'); ylabel('y');

title('Mean value theorem');

**Output (via Command Window):**

Values of c lying in the interval I are  
 -2.7859  
 4.7859  
  
The Tangent Lines at c are  
y == 42.0\*x + 67.53  
y == 42.0\*x - 149.5



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_