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

Digital Assignment SL. 2, Experiment – 1B: Maxima and Minima of a function of one variable

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(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) Evaluate and visualize the local extrema of the function x^3 - 12*x - 5 on the interval (-4,4).

A: Code is as follows:

```
%Evaluate and visualize the local extrema of the function
% x^3 - 12*x - 5 on the interval (-4,4).


clear
clc
syms x
f(x)=x^3-12*x-5;
I=[-4,4];
f1(x)=-f(x);
a=I(1);b=I(2);
t=linspace(a,b,10000); %Discretizing the interval I
g=double(f(t)); %Finding the values of f(x) at t values
[lmax_f,loc]=findpeaks(g);
lmax_x=round(t(loc),4);
h=double(f1(t));
[lmin_f,loc]=findpeaks(h);
lmin_x=round(t(loc),4);
disp('Local maximum occur at x=')
disp(lmax_x)
disp('The Local Maximum value(s) of the function are ')
disp(double(f(lmax_x)))
disp('Local minimum occur at x=')
disp(lmin_x)
disp('The Local Minimum value(s) of the function are ')
disp(double(f(lmin_x)))
plot(t,f(t));hold on; %Plotting the function
plot(lmax_x,double(f(lmax_x)),'or');%Pointing the local
% maxima on the curve of f(x)
plot(lmin_x,double(f(lmin_x)),'*g');%Pointing the local
% minima on the curve of f(x)
hold off
```

Output (via Command Window):

```
Local maximum occur at x=
   -1.9998

The Local Maximum value(s) of the function are
   11.0000

Local minimum occur at x=
    1.9998

The Local Minimum value(s) of the function are
  -21.0000
```