MA423 Lab-04

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Question 1

In q1.m, the polynomial $x^3 + 4x^2$ - 7x + 6 is considered.
Using the function horner(p,x) which evaluates a polynomial at points, we find the values of the above polynomial at various points.

At -5.000000, value of polynomial is 4.000000
At -3.000000, value of polynomial is 24.000000
At -2.000000, value of polynomial is 16.000000
At 0.000000, value of polynomial is -6.000000
At 1.000000, value of polynomial is -8.000000
At 2.000000, value of polynomial is 4.000000

Question 2

The functions horner and bisect are used to evaluate a polynomial and find a root in an interval respectively.
The intervals taken are all subsets of [1.95,2.05] and get progressively smaller in size.
We observe that the roots found are not 2 but they shift closer to 2 as the intervals get smaller.
This is due to the rounding errors in horner's method.

Roots found:
In interval [1.955000,2.045000] , root found is 2.040781
In interval [1.960000,2.040000] , root found is 2.023750
In interval [1.965000,2.035000] , root found is 1.968281
In interval [1.970000,2.030000] , root found is 2.020625
In interval [1.975000,2.025000] , root found is 2.020312
In interval [1.980000,2.020000] , root found is 2.013750
In interval [1.985000,2.015000] , root found is 1.990625
In interval [1.990000,2.010000] , root found is 2.006250
In interval [1.995000,2.005000] , root found is 2.003750

Question 3

The plots differ from one another in orders of 10^{-11} .
The rounding error obtained when evaluating the polynomial using Horner's method is bringing in slight changes to the value of p(x) at points in a small neighborhood of 2.
Due to this, the graph shown below depicts the plot of horner(p,x) having multiple roots other than 2.