* Homework of Numerical Analysis:
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For polynomial interpolation with equally spaced points, we had the expression of the error;

where we have .

From these we got, if then .

From this point of view, we want to minimize so that the errors, on average, would be less. Consider, **n=6**. Therefore, we have 7 points to consider,

.

Now, writing and we get the expression;

.

To find its local maximum and minimums in the interval and , we differentiate the above expression with respect to w. (Differentiating with respect to x and with respect to w are essentially same as they differ by a constant x3 and change of scale by h.)

Hence, ,

Rewriting gives the cubic polynomial to solve , which has the roots .

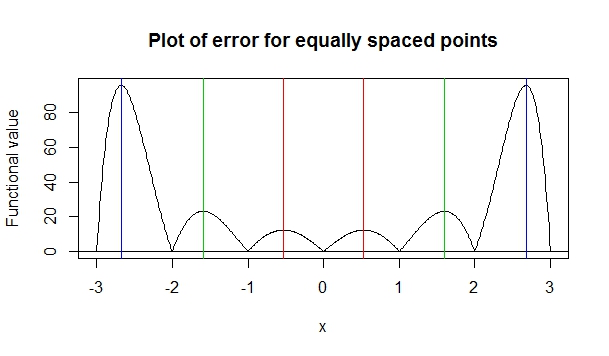
It gives the approximate roots of the equation as,

, , , , and .

These are the points where the maximum of can occur. Eventually, these points are the local maxima as the graph suggests.

There are a few features that can be observed from these;

1. The roots are symmetric about 0, which means the local maximums are at the points distributed symmetrically on both sides of the “middle” of the interval i.e. .

2. Observing the modulus of the roots says, , implying these points lie in the interval . Similarly, we have , and .

Computing the value of at ’s we get;

1. .
2. .
3. .
4. .
5. .

This values shows that we have the following solution for the given problem.

* In the interval , the maximum of occurs at and the maximum value is .
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