MA311 (Scientific computing)-IITG

30-08-18

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1. Consider the function $f : x \to \dfrac{1}{1+x^2}, \quad x \in [-5, 5]$. Find the Lagrange interpolation polynomial of degree 10, interpolating the function f at 11 equally spaced points. Plot both f and p_{10} in a same frame and compare. Also compute the Hermite interpolation polynomial of degree $2n + 2$ interpolating the function f at those points as in the previous case. Compare those three functions in a single plot. Do you see any significant improvement in the approximation?

2. Use inverse interpolation to find an approximation to the solution of $x - e^x = 0$, using the data

x	0.3	0.4	0.5	0.6
e^{-x}	0.740818	0.670320	0.606531	0.548812

3. Use both forward and backward Newton's divided difference method to find an approximate value of $f(1.5)$, from the following data, using the polynomial of possible highest degree. The exact value of $f(1.5)$ is 0.5118277. Compare the absolute error in both the methods. What do you observe? which method is giving a better approximation and why?

x	$f(x)$
1.0	0.7651977
1.3	0.6200860
1.6	0.4554022
1.9	0.2818186
2.2	0.1103623
2.5	- 0.0483838