HW8

Friday, October 27, 2023 9:36 AM

1. Consider the task of interpolating the function $f(x) = \frac{1}{1+x^2}$ on the interval $[-5, 5]$. Using equispaced nodes with $n = 5, 10, 15$ and 20, interpolate the function using the methods below:

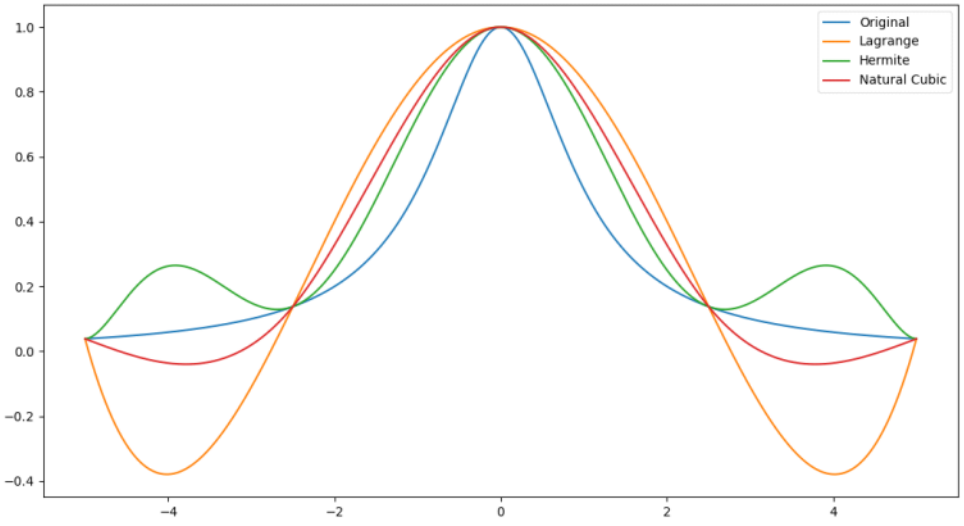
   (a) Lagrange interpolation.

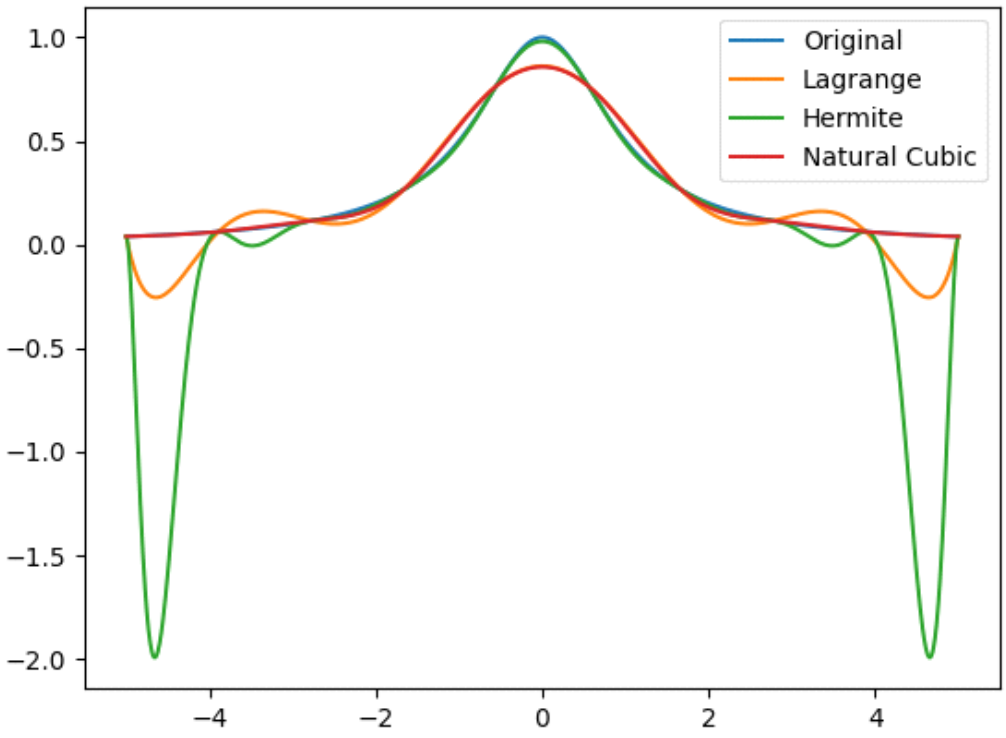
   (b) Hermite interpolation.

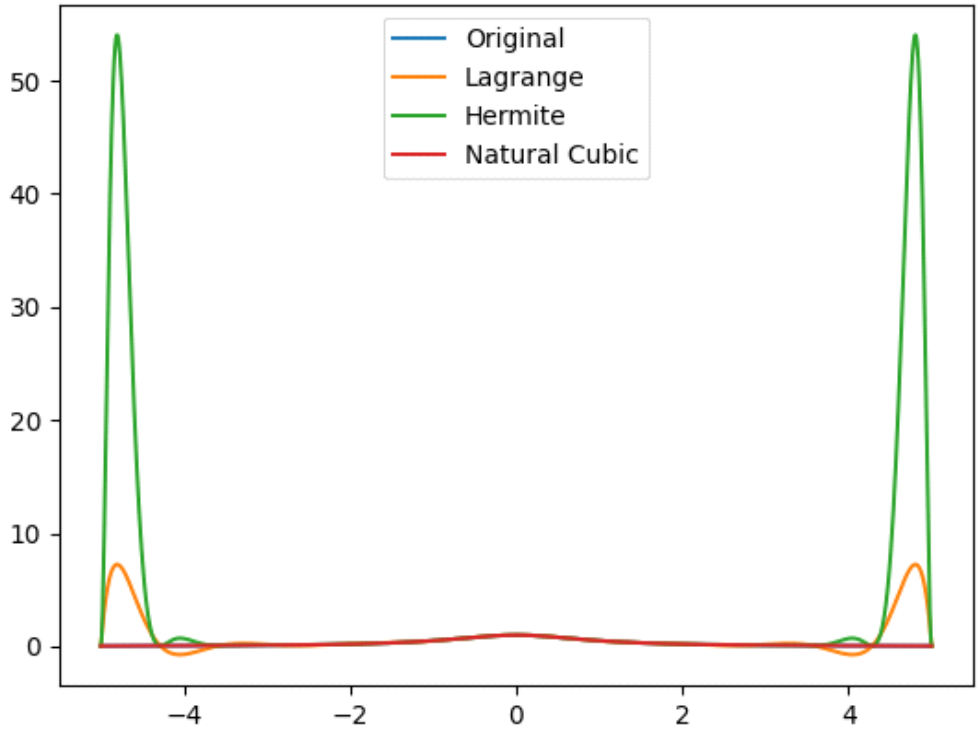
   (c) Natural Cubic spline.

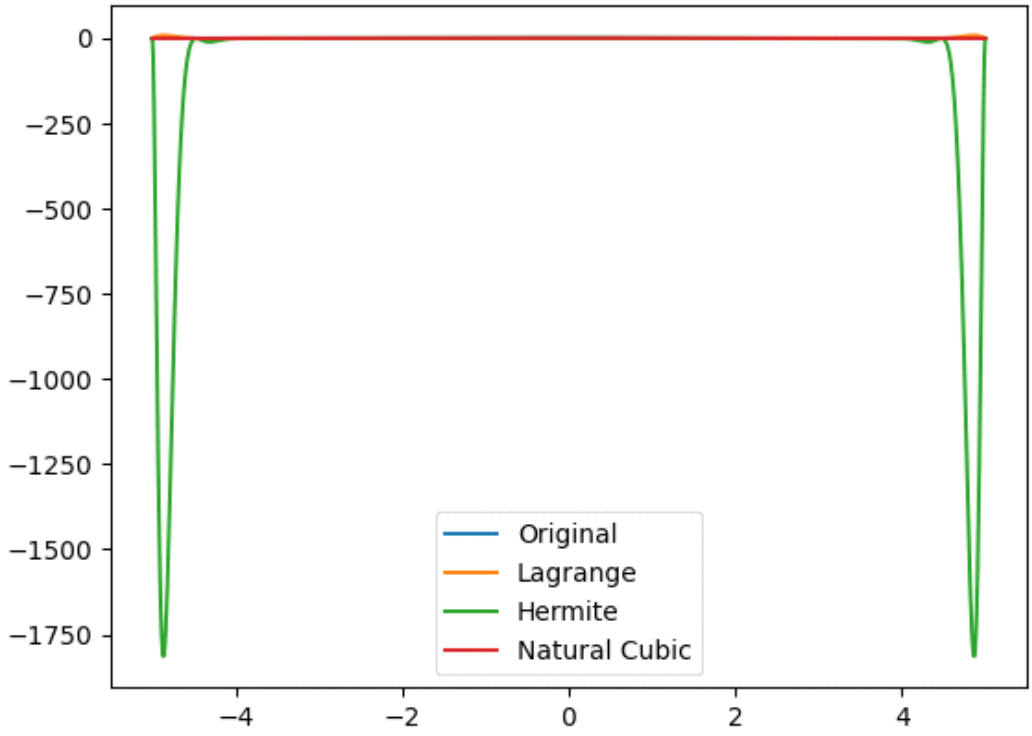
   (d) Clamped Cubic spline.

   Which method performs best? Do you have an intiution why?




Original
Lagrange
Hermite
Natural Cubic
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−4
−2
0
2
4


Original
Lagrange
Hermite
Natural Cubic
50
40
30
20
10
0
−4
−2
0
2
4



The natural cubic spline performed the best since it only interpolates the function piecewise on small intervals, while the other interpolations have to do so over the entire interval and so are subject to more variation.