

## Lab 5

### Hermite interpolation

1. In the following table there are some data regarding a moving car. Use Hermite interpolation to estimate position and speed of the car when the time is  $t = 10$ .

Time	0	3	5	8	13
Distance	0	225	383	623	993
Speed	75	77	80	74	72

2. Plot, in the same figure, the graphs of the function  $f : [-5, 5] \rightarrow \mathbb{R}$ ,  $f(x) = \sin 2x$  and of the corresponding Hermite interpolation polynomial, considering 15 equidistant nodes in  $[-5, 5]$ .

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*Facultative:*

3. The data from the following table are generated using the function  $f(x) = x \ln x$  :

$x$	$f(x)$	$f'(x)$
8.3	17.56492	3.116256
8.6	18.50515	3.151762

Use the Hermite interpolation polynomial to approximate  $f(8.4)$  and find the absolute error.

4. Let  $f(x) = 3xe^x - e^{2x}$ .

a) Approximate  $f(1.03)$  by the Hermite interpolation polynomial of degree at most three, using  $x_0 = 1$  and  $x_1 = 1.05$  and find the absolute error.

b) Repeat (a) with the Hermite interpolation polynomial of degree at most five, using  $x_0 = 1$  and  $x_1 = 1.05$  and  $x_2 = 1.07$  and find the absolute error.

c) Plot the graphs of the function  $f$  and of the interpolation polynomials from (a) and (b).