

## Math 4513, Homework 3, Due on 10/19/2011

1. (10 points) A car traveling along a straight road is clocked at a number of points. The data from the observations are given in the following table, where the time is in seconds, the distance is in feet, and the speed is in feet per second.

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

- (a) Use a Hermite polynomial to predict the position of the car and its speed when  $t = 10$ .
- (b) Use the derivative of the Hermite polynomial to determine whether the car ever exceeds a 55 mi/h speed limit on the road. If so, what is the first time the car exceeds this speed?
- (c) What is the predicted maximum speed for the car?
2. (10 points) It is known that function  $f(x)$  satisfies

x	0.9	1.3	1.9	2.1	2.6	3.0	3.9
f(x)	1.3	1.5	1.85	2.1	2.6	2.7	2.4
x	4.4	4.7	5.0	6.0	7.0	8.0	9.2
f(x)	2.15	2.05	2.1	2.25	2.3	2.25	1.95
x	10.5	11.3	11.6	12.0	12.6	13.0	13.3
f(x)	1.4	0.9	0.7	0.6	0.5	0.4	0.25

- (a) Compute the Lagrange interpolation  $L(x)$  using the given data. Draw the graph of  $L(x)$ .
- (b) Compute the natural cubic spline  $S(x)$  using the given data. Draw the graph of  $S(x)$ .