HW3

1. Use the Lagrange interpolating polynomials of degree one, two, three and four to approximate $\cos(0.750) = 0.7317$ if $\cos(0.698) = 0.7661$, $\cos(0.733) = 0.7432$, $\cos(0.768) = 0.7193$, $\cos(0.803) = 0.6946$.

   Find the error bound.

```
degree 1 interpolation P1(0.750) = 0.732077
degree 2 interpolation P2(0.750) = 0.731716
degree 3 interpolation P3(0.750) = 0.731704
degree 4 interpolation P4(0.750) = 0.731704
real value cos(0.750) = 0.731689
Error for P1: 3.882740e-04
Error for P2: 2.745766e-05
Error for P3: 1.508681e-05
Error for P4: 1.508681e-05
```

2. Use iterated inverse interpolation to find an approximation to the solution $x - e^{-x} = 0$ using the data $e^{-0.3} = 0.740818$, $e^{-0.4} = 0.670320$, $e^{-0.5} = 0.606531$, $e^{-0.6} = 0.548812$.

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Linear inverse interpolation x ≈ 0.567545
Quadratic inverse interpolation x ≈ 0.567146
True solution x = 0.567143
Error in linear interpolation: 4.012948e-04
Error in quadratic interpolation: 2.730595e-06
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3. A car travelling 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 T is in seconds, the distance D is in feet, and the speed V is in feet per second.

T	0	3	5	8	13
D	0	200	375	620	990
V	75	77	80	74	72

   a. Use a Hermite polynomial to predict the position of the car and its speed when $t = 10$ s.

   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 ?

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a. when t = 10: position = 768.96ft, speed = 74.64ft/s
b. The First time that vehicle reached 55 mile t = 3.15s
c. maximum speed is 84.32ft/s(57.49mile/hr), when t = 6.18s
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