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

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.

```
PS C:\Users\afatf\Desktop\E94116067_numerical_hw3>
Order 1: 0.76610000 , Error Bound: 0.03500000
Order 2: 0.73207714 , Error Bound: 0.00122500
Order 3: 0.73171633 , Error Bound: 0.00004287
Order 4: 0.73170396 , Error Bound: 0.00000150
PS C:\Users\afatf\Desktop\E94116067_numerical_hw3>
```

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

```
PS C:\Users\afatf\Desktop\E94116067_numerical_hw3>
x: 0.56714309
PS C:\Users\afatf\Desktop\E94116067_numerical_hw3>
```

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```
PS C:\Users\afatf\Desktop\E94116067_numerical_hw3>
a: 762.019231 ft
b: No, time: -20.614540 s
c: 80.027817 ft/s
PS C:\Users\afatf\Desktop\E94116067_numerical_hw3>
```