Practice Problems

1.

1. Use Hermite polynomial that agrees with the data listed below to find the approximation of f(1.5)

k	x_k	$f(x_k)$	$f'(x_k)$
0	1.3	0.6200860	-0.5220232
1	1.6	0.4554022	-0.5698959
2	1.9	0.2818186	-0.5811571

2

1. Find the value of y for $x=2.1$ using a 2^{nd} order Lagrange polynomial with the appropriate data

Sl.	x	Y
1	-1	2.2
2	0	10.6
3	1	17.0
4	2	22.4
5	3	25.8

2. What is Round off error and Truncation true error in numerical method?

3

3. Let's assume you have a dataset as given below. Perform second order Lagrange interpolation and Newton's divided difference interpolation to find the f(x) for x=1.5. Also comment on the results that you are getting from the two methods.

x	1	1.3	1.6	1.9	2.2
f(x)	0.1411	−0.6878	−0.9962	−0.5507	0.3115

4.

a) Given β=2, m=4, e_{min} = -2, e_{max} = 0.

1. Find out the values that each group represents for the sets of e, and plot them on a number line starting from 0.
2. Calculate the machine epsilon for the problem ϵ_m.

b) Write down the Mathematical notation for **Fixed-point Representation** and **Floating-Point Representation** and explain each term.

5.

The upward velocity of a rocket is given as a function of time (t) as:

s	m/s
0	0
7	101
15	197
22	280
27	360
32	460

a) Determine the value of the velocity at t=16 seconds with fourth order polynomial interpolation using Newton's divided difference polynomial method.

b) Using the third order polynomial interpolant for velocity, find the distance covered by the rocket from t=11s to t=16s.

c) Using the third order polynomial interpolant for velocity, find the acceleration of the rocket at t=16s.

6.

11. . Find the value of y for $x=1.8$ using a *3rd* order Newton's divided difference polynomial with the appropriate data sets from the table below.

Sl.	x	Y
1	-1	2.5
2	0	12.6
3	1	19.0
4	2	22.4
5	3	27.8

7. Let f(x) = Cos(x) and the nodes are {-pi/4,0,pi/4). Use Cauchy's theorem to find the upper bound of the error

8. Using the combination B=2, m=4, and e [-1,2]

a. **Find the max value for convention (1).**
b. **Find the min non-negative value for convention (1).**
c. **Find the min value for convention (1).**
d. **Find the combination of values possible.**