Assignment 1

CHAPTER 4: INTERPOLATION

1. Use appropriate interpolation techniques to find $y(x)$ and estimate $y(15)$ and $y(85)$ from the following data:

x	10	30	50	70	90
y	34	56	45	23	36

2. Use: **a)** Gauss' forward &
b) Gauss' backward formula to evaluate y_{25}, given that $y_{20} = 24$, $y_{24} = 32$, $y_{28} = 35$, $y_{32} = 40$

3. Write Stirling's formula and use it to find u_{42}, given that $u_{30} = 49225$, $u_{35} = 48316$, $u_{40} = 47236$, $u_{45} = 45926$, $u_{50} = 44306$.

4. From the following data, estimate the number of items having price between Rs. 2000-2500 using Bessel's Formula.

Price in Rs.	0-1000	1000-2000	2000-3000	3000-4000	4000-5000
No. of items	114	220	325	434	535

5. **a)** Write a pseudocode to interpolate the given sets of data using Lagrange's Interpolation.
b) Obtain the Lagrange's polynomial f(x) and find the missing term in the table given below:

Year	2005	2007	2008	2010	2015
Profit in Crores	43	65	?	160	250

6. Use Newton's divided difference formula to find **f(x)** and calculate **f(3)** from the given data: **f(0)**=1, **f(1)**=14, **f(2)**=15, **f(4)**=5, **f(5)**=6, and **f(6)**=19.

7. What is the practical significance of the least squares method of curve fitting? Derive the normal equations to fit a given set of data to a linear equation: $y = ax + b$.

8. Fit a second-degree polynomial function to the following data:

x	2	4	6	8	10	12	14
y = f(x)	20.4	18.6	18.1	16.5	15.9	17.4	19.3

9. The variables t and s are connected by the relation: $t = a + be^{cs}$ and their corresponding values are given in the following table. Find the best possible values of a, b and c.

s	1	2	6	8	11
t	12.7	12.5	11.6	11.3	11

10. Use least squares method to fit the given data using the model: $y = ax + b + c/x$.

x	0	5	10	15	20	25
y	12	15	17	22	24	30

11. Find y at $x = 4.5$ from the following data using Natural Cubic Spline interpolation.

x	1	3	5	7	9
y	10	12	11	13	9

12. Compute $y'(3.5)$ from the following data using Cubic Spline Interpolation.

x	1	2	3	4
y	1	5	11	8

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