SAPTHAGIRI NPS UNIVERSITY

Mathematics Department

II SEMESTER

MODULE 5- NUMERICAL METHODS -II

LAGRANGE'S INTERPOLATION:

1. Using Lagrange's formula, find the interpolation polynomial that approximates to the functions described by the following data

x	0	1	2	5
f(x)	2	3	12	147

2. Use Lagrange's interpolation formula to find f(4) given

x	0	2	3	6
f(x)	-4	2	14	158

3. The following table gives the normal weights of babies during first eight months of life

Age(in months)	0	2	5	8
Weight(in pounds	6	10	12	16

Estimate the weight of the baby at the age of seven months using Lagrange's interpolation formula

4. Use Lagrange's interpolation formula to fit a polynomial for the data.

x	0	1	3	4
y	-12	0	6	12

Hence estimate y at x = 2

5. Use Lagrange's interpolation formula to find y at x=10 given

x	5	6	9	11
y	12	13	14	16

6. If y(1)=3, y(3)=9, y(4)=30, y(6)=132, find Lagrange's interpolation polynomial that takes on these values.
7. Apply Lagrange's formula inversely to find root of the equation $f(x) = 0$ given that $f(30) = -30,\ f(34) = -13,\ f(38) = 3,\ f(42) = 18.$
8. Apply Lagrange's formula inversely to find x when y=6 given the data

x	20	30	40
y	2	4.4	7.9

NUMERICAL INTEGRATION:

1. Evaluate $\int_0^2 \frac{dx}{16+x^2}$ by applying Trapezoidal rule by taking six equal parts.
2. Evaluate $\int_0^5 \frac{1}{4x+5}\ dx$ by using Trapezoidal rule by taking 11 ordinates.
3. Evaluate $\int_0^{\pi/2} cosx\ dx$ by applying Trapezoidal rule, taking eleven ordinates.
4. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3rd rule, dividing interval (0, 1) into six equal parts and hence find approximate value of .
5. Using Simpson's 1/3rd rule, evaluate $\int_0^{0.6} e^{-x^2}$ by dividing 7 ordinates.
6. Use Simpson's 1/3rd rule with seven ordinates to evaluate $\int_2^8 \frac{dx}{\log_{10} x}$.
7. By dividing the range into 6 equal parts, find the approximate value of $\int_0^{\pi} e^{sinx} dx$ using Simpson's 1/3rd rule.
8. Evaluate $\int_0^{\pi/2} \sqrt{cos\theta}\ d\theta$ using Simpsons 1/3rd rule, taking equal parts.
9. Use Simpson's 3/8th rule to evaluate $\int_0^1 \frac{xdx}{1+x^2}$ by taking 7 ordinates
10. Evaluate $\int_0^1 \frac{dx}{1+x}$ taking 7 ordinates by applying Simpson's 3/8th rule. Hence deduce the value $\log_e 2$.
11. Evaluate $\int_0^{0.3} (1-8x^3)^{1/2}\ dx$ using Simpson's 3/8 th rule taking seven ordinates.
12. Evaluate $\int_0^3 \frac{dx}{(1+x)^2}$ by Simpson's 3/8th rule.
13. Evaluate $\int_4^{5.2} log_e x\ dx$ by using Weddle's rule taking 7 ordinates.
14. Evaluate $\int_0^1 \frac{xdx}{1+x^2}$ by using Weddle's rule taking 7- ordinates and hence find the value $\log_e 2$
15. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Weddle's rule taking 7 ordinates.
16. Use Weddle's rule $\int_0^1 \frac{dx}{(1+x)^2}$ taking 6 equal parts..
17. Use Weddle's rule $\int_{-\pi/2}^{\pi/2} \cos x\ dx$ by dividing $[-\pi/2\ ,\ \pi/2]$ into six equal parts.