RV COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to VTU, Belagavi)
Department of Mathematics

UNIT-5 : NUMERICAL METHODS
TUTORIAL SHEET-1

Objective Type Questions:

1. $\nabla^2(y_1)$ is _____
2. In a Polynomial of n^{th}degree $(n + 1)^{th}$ forward differences will be _____.
3. Given a set of points (x_i, y_i). For conducting Interpolation using Newton Gregory formulae x values should be _____.
4. In terms of backward difference $\Delta^2 y_3$ is
5. Given that x : 10 20 30 40

   y : 100 39 14 -1

   The process of finding y at x = 60 is called _____ .
6. The Lagrange's Interpolating polynomial which takes the values (x_i, y_i) for $i = 0$, 1, 2 ,3 will be _____.
7. If $f(x) = 3x^3 - 2x^2 + 1$, then $\Delta^3 f(x)$ =_____.
8. If $y = x^2 - 2x + 2$, taking interval of differencing as unity, then $\Delta^2 y =$ ____
9. The nth difference of a polynomial of degree n is _____.

Answer the following:

1. Using Newton – Gregory Interpolation formulae, estimate f (0.12) from the following data.

x	0.10	0.15	0.20	0.25	0.30
f(x)	0.1003	0.1511	0.2027	0.2553	0.3093

2. Apply Newton's backward difference interpolation formula to find f(7.5) from the following table:

x	1	2	3	4	5	6	7	8
y = f(x)	1	8	27	64	125	216	343	512

3. Use the Lagrange's interpolation formula to estimate f(2.5) from the following data:

x	1	2	3	5	8
f(x)	2	3	6	9	13

4. Using Lagrange's formula find the form of the function y(x) from the table.

x	0	1	3	4
y	-12	0	12	24

5. Fit a cubic polynomial to the following data using suitable interpolation formula.

x	0	1	2	3
f(x)	-2	2	12	34

6. Using Newton – Gregory Interpolation formulae, estimate f (0.12) from the following data.

x	0.10	0.15	0.20	0.25	0.30
f(x)	0.1003	0.1511	0.2027	0.2553	0.3093

7. Apply Newton's backward difference interpolation formula to find (7.5) from the following table:

x	1	2	3	4	5	6	7	8
y = f(x)	1	8	27	64	125	216	343	512

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UNIT-5 : NUMERICAL METHODS

TUTORIAL SHEET-2

1. Find $y'(0)$ and $y''(0)$ from the following table:

x:	0	1	2	3	4	5
y:	4	8	15	7	6	2

2. Given $\sin 0^o = 0.000, \sin 10^o = 0.1736,\ \sin 20^0 = 0.3420,\ \sin 30^o = 0.5000, \sin 40^o = 0.6428$, find the numerical value of $\frac{dy}{dx}$ at $x = 10^o$ and $\frac{d^2y}{dx^2}$ at $x = 20^o$
3. The following data corresponding values of pressure and specific volume of a superheated steam.

v:	2	4	6	8	10
p:	105	42.7	25.3	16.7	13

Find the rate of change of (i) pressure with respect to volume when v=2
(ii) volume with respect to pressure when p=105.

4. A rod is rotating in a plane. The following table gives the angle θ (radians) through which the rod has turned for various values of the time t second.

t:	0	0.2	0.4	0.6	0.8	1.0	1.2
θ:	0	0.12	0.49	1.12	2.02	3.20	4.67

Calculate the angular velocity and the angular acceleration of the rod, when t=1.0 second.