SRM Institute of Science and Technology
Department of Mathematics
21MAB206T- Numerical Methods and Analysis
UNIT –III Tutorial Sheet-3
Part-A

1. The following data gives the velocity of a particle for 20 seconds at an interval of 5 seconds. Find the initial acceleration using the entire data.

Time(sec)	0	5	10	15	20
Velocity(m/sec)	0	3	14	69	228

Ans: Acceleration=1m/sec^2

2. Find $f'(8)$ given $f(6)=1.556, f(7)=1.690, f(9)=1.908, f(12)=2.158$

Ans: 0.109

3. The following data give the corresponding values for pressure and specific volume of a superheated steam.

Volume (v):	2	4	6	8	10
Pressure (p):	105	42.7	25.3	16.7	13.0

Find the rate of change of pressure w.r.t. volume when $v=2$. **Ans:** -52.4

4. The table below gives the velocity v of a particle at time t seconds. Find the distance covered by the particle in 12 seconds.

t:	0	2	4	6	8	10	12
v:	4	6	16	34	60	94	136

Ans: 552 metres

5. The speeds of a train at various times are given by

$t(hour)$:	0	0.5	1	1.5	2	2.5	3	3.25	3.5
$v(in\,kmph)$:	0	13	33	39.5	40	40	36	15	0

Find the total distance covered**.** **Ans:** 1.6666km

Part-B

6. A rod is rotating in a plane. The following table gives the angle θ (in radians) through which the rod has turned for various values for the time 't' seconds.

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

Calculate the angular velocity and the angular acceleration of the rod when t=0.6 seconds.
Ans: angular velocity=3.81665 radians/sec. and angular acceleration=6.75 radians/sec^2.

7. The table below gives the results of an observation: θ is the observed temperature in degrees centigrade of a vessel of cooling water; t is the time in minutes in the beginning of an observation.

t:	1	3	5	7	9
θ:	85.3	74.5	67.0	60.5	54.3

Find the approximate rate of cooling at $t=3$ and 3.5.

Ans: $\left(\frac{d\theta}{dt}\right)_{t=3} = -4.31667$ and $\left(\frac{d\theta}{dt}\right)_{t=3.5} = -3.96718$

8. By dividing the range into ten equal parts, evaluate $\int_0^{\pi} \sin x\,dx$ by Trapezoidal and Simpson's rule. Verify your answer with integration.

Ans: Trap.rule=1.9843 nearly, Simson's one-third rule=2.00091.

9. The velocity of at train which starts from rest is given by the following table, the time being reckoned in minutes from the start and speed in miles per hour.

Minutes:	2	4	6	8	10	12	14	16	18	20
Miles/hour:	10	18	25	29	32	20	11	5	2	0

Find the total distance covered in 20 minutes. **Ans**: 5.16 miles.