

**DEPARTMENT OF MATHEMATICS, IIT ROORKEE**  
**MAB-103: Numerical Methods**

**Assignment-6**

Divided Difference and Numerical Differentiation

Session: 2025-26

1. Using Newton's divided difference formula, find the value of  $y$ , for  $x = 0.72$ , from the following table:

x:	0.62	0.68	0.70	0.73	0.75
y:	0.6604918	0.7336304	0.7585837	0.7965858	0.8223167

2. Using Newton's divided difference formula, find the value of  $y$ , for  $x = 1.25$ , from the following table:

x:	1.0	1.1	1.3	1.5	1.6
y:	0.3639	0.3258	0.2612	0.2095	0.1876

3. Find  $\log_{10}(310)$  by Newton's divided difference formula from the following table:

x:	300	304	305	307
$\log_{10}(x)$ :	2.4771	2.4829	2.4843	2.4871

4. Use Newton's forward difference formula, compute  $f'(1.1)$  and  $f''(1.1)$ , from the following table:

x:	1.1	1.2	1.3	1.4	1.5
f(x):	2.0091	2.0333	2.0692	2.1143	2.1667

5. The function  $f(x)$  is tabulated below, for different values of  $x$ .

x:	0	5	10	15	20
f(x):	1.5708	1.5738	1.5828	1.5981	1.6200

Compute the first and second derivatives of  $f(x)$  at  $x = 0, 3, 18$  and  $20$ .

6. The function  $f(x)$  is tabulated below, for different values of  $x$ .

x:	0.4	0.6	0.8	1.0	1.2
f(x):	1.08107	1.18546	1.33743	1.54308	1.81066

Using Stirling's formula, compute  $f'(0.8)$ ,  $f''(0.8)$ ,  $f'(0.82)$  and  $f''(0.82)$ .

7. From the following table, find the value of  $x$ , correct to 2D, for which  $y$  is maximum. Hence, find the corresponding value of  $y$ :

x:	1.2	1.3	1.4	1.5	1.6
y:	0.4660	0.4818	0.4928	0.4988	0.4998

8. A function  $y = f(x)$  has a minimum in the interval  $0.2 < x < 1.4$ . Find the minima.

x:	0.2	0.4	0.6	0.8	1	1.2	1.4
f(x):	2.10022	1.98730	1.90940	1.86672	1.85937	1.88737	1.95063

**Answers:**

- (1) 0.7838405
- (2) 0.2760
- (4) 0.1737, 1.4750
- (5) 0.0002, 0.0023, 0.0003, 0.0003
- (6) 0.8881, 1.3375, 0.9150, 1.3557.