

Exercise

1. Find first and second derivatives of the function given below at the point $x = 1.2$.

x	1	2	3	4	5
y	0	1	5	6	8

Ans: $f'(1.2) = -1.7733$, $f''(1.2) = 14.16$

2. From the following data, find $f'(10)$:

x	3	5	11	27	34
$f(x)$	-13	23	899	17315	35606

Ans: 233

3. Find $\frac{dy}{dx}$ at $x = 1$ from the following table:

x	0.7	0.8	0.9	1.0	1.1	1.2	1.3
y	0.644218	0.717356	0.783327	0.841471	0.891207	0.932029	0.963558

Ans: 0.54030

4. For the following pairs of values of x and y find numerically the first derivatives at $x = 4$

x	1	2	4	8	10
y	0	1	5	21	27

Ans: 2.8326

5. Find $f'(6)$ from the following data:

x	0	1	3	4	5	7	9
$f(x)$	150	108	0	-54	-100	-144	-84

Ans: -23

6. A curves $y = f(x)$ passes through the points $(-4, 1245)$, $(-1, 33)$, $(0, 5)$, $(2, 9)$ and $(5, 1335)$. Find $y'(1)$, $y''(1)$ and the radius of curvature $\rho = \frac{\{1+(y')^2\}^{3/2}}{y''}$ at $x = 1$.

Ans: (-5.0, 18.0, 7.36525)

7. Find the best possible value of $y'(93)$ from the following table:

x	60	75	90	105	120
y	28.2	38.2	43.2	40.9	37.0

Ans: -0.03627

8. Estimate the velocity and the acceleration of a moving particle at $t = 0.3$, whose distance along a straight line at various times are as follows:

t(sec)	0.1	0.2	0.3	0.4	0.5
x(m)	31.62	32.87	33.64	33.95	33.81

Ans: 5.3750 m/s, -45.9167 m/s²
