Linear Regression Assignment

Task-1 :-

Weight X	price Y	XY	X^2
2	35	70	4
4	60	240	16
5	20	100	25
3	50	150	9
6	50	300	36
5	55	275	25
7	60	420	49

Now calculating -

$$\bar{X} = \frac{2+4+5+3+6+5+7}{7} = 4.5714$$

$$\bar{Y} = \frac{35+60+20+50+50+55+60}{7} = 47.1428$$

$$\overline{XY} = \frac{70+240+100+150+300+275+420}{7} = 222.1428$$

$$(\bar{X})^2 = (4.5714)^2 = 20.8977$$

$$\overline{X^2} = \frac{4+16+25+9+36+25+49}{7} = 23.4286$$

$$m = \frac{\bar{X}\cdot\bar{Y} - \overline{XY}}{(\bar{X})^2 - \overline{X^2}}$$

$$= \frac{\{(4.5714) \times (47.1428)\} - 222.1428}{20.8977 - 23.4286}$$

$$= \frac{-6.6342}{-2.5309}$$

$$= 2.6213$$

$$c = \bar{Y} - m\bar{X}$$

$$= 47.1428 - (2.6213) \times (4.5714)$$

$$= 35.1598$$

The required equation will be—

$$y = 2.6213x + 35.1598$$

When the Vegetable weight is 6, then the price will be

$$y = 2.6213 \times 6 + 35.1598$$

$$= 50.8876$$

Task-2

#compute the Residuals for each data.

Residuals = Actual value − predicted value

Weight	Price (Actual value)	predicted value	Residual
2	35	40.4024	−5.4024
4	60	45.645	14.355
5	20	48.2663	−28.2663
3	50	43.0237	6.9763
6	50	50.8876	−0.8876
5	55	48.2663	6.7337
7	60	53.5089	6.4911

Task-3

$$MSE = \frac{1}{n}\sum_{i=1}^{n}(y_{actual} - y_{predicted})^2$$

$$= \frac{(-5.4024)^2 + (14.355)^2 + (-28.2663)^2 + (6.9763)^2 + (-0.8876)^2 + (6.7337)^2 + (6.4911)^2}{7}$$

$$= 167.31$$

$$MAE = \frac{1}{n} \sum_{i=1}^{n} \left| y_{observed} - y_{predicted} \right|$$

$$= \frac{5.4024 + 14.325 + 28.2663 + 6.9763 + 0.8876 + 6.7337 + 6.4911}{7}$$

$$= 9.8732$$