Assignment- 04

Weight	Price
x	y
2	35
4	60
5	20
3	50
6	50
5	55
7	60
6	2(50.3)

calculate: slope m and y intercept c using linear regression and predict the price when vegetable weight 6.

Task-01

0	A	B	C	D	E	F	G	H	I
1	x	y	xy	x^2	$\bar{x}$	$\bar{y}$	$\overline{xy}$	$\bar{x}^2$	$\overline{x^2}$
2	2	35	70	4					
3	4	60	240	16					
4	5	20	100	25	sum =	sum =	sum =		
5	3	50	150	9	32	330	1155	20.89	168
6	6	50	300	36	$=\frac{32}{7}$	$\frac{330}{7}$	$\frac{1155}{7}$		$\frac{168}{7}$
7	5	55	275	25	= 4.57	= 47.14	= 222.14		= 24
8	7	60	420	49					

$$M = \frac{\bar{x}.\bar{y} - \overline{xy}}{(\bar{x})^2 - \overline{x^2}} = \frac{4.57.47.14 - 222.14}{20.89 - 24}$$

$$= 2.1608$$

$$c = \bar{y} - M\bar{x} = 47.14 - 2.16608 \times 4.5714 = 37.26$$

$Y = mx + c$

$= 2.1608 \times 6 + 37.26$

$= 50.33.$

Residuals calculations: Task-2

$Y_0 = mx + c$

$Y_1 = 2.1608 \cdot 2 + 37.26$

$= 41.58.$

$Y_2 = 2.1608 \times 4 + 37.26$

$= 45$

$Y_3 = 2.1608 \times 5 + 37.26$

$= 48.06$

$Y_4 = 2.1608 \times 3 + 37.26$

$= 43.74$

$Y_5 = 2.1608 \times 6 + 37.26$

$= 50.22$

$Y_6 = 2.1608 \times 15 + 37.26$

$= 48.06$

$Y_7 = 2.1608 \times 7 + 37.26$

$= 52.38$

observed	predicted	Residual
35	41.58	6.58
60	45	15
20	48.06	28
50	43.74	6.26
50	50.22	0.22
55	48.06	6.78
60	52	8

Task-2

calculate the mean squared ERROR and mean absolute ERROR

$$MAE = \frac{1}{n}\sum_{i=1}^{n} |y_i - \hat{y}_i| \qquad MSE = \frac{1}{n}\sum (y_i - \hat{y}_i)^2$$

$$MAE = \frac{1}{7}\,|6.58| + |15| + |28| + |6.26| + |0.22| + |4.78| + |8|$$

$$= 9.83 \cdot MAE$$

$$MSE = \frac{1}{7}\sum (y_i - \hat{y}_i)^2$$

$$= \frac{1}{7}\,(33 - 48.58)^2 + (60 - 44)^2 + (20 - 48.06)^2 + (50 - 43.74)^2 + (50 - 30.22)^2 + (55 - 48.06)^2 + (60 - 52)^2$$

$$= \frac{1}{7}\,48.29 + 225 + 787.86 + 39 + 0.0484 + 22.8484 + 64$$

$$= 169 \cdot (MSE)$$