Q12

given;

Weight vector : $w = [1, -2, 3, -4]$

Bias term $w_0 = 25$

Feature $x = [10, 20, 30, 40]$

(a) Predicted output:-

The linear regression prediction formula is

$$y = w_0 + w_1x_1 + w_2x_2 + w_3x_3 + w_4x_4$$

plugging the value in:-

$$y = 25 + (1 \times 10) + (-2 \times 20) + (3 \times 30) + (-4 \times 40)$$

This will give:-

- $25 + 10 - 40 + 90 - 160$
- Combine terms : $25 + 10 = 35$; $35 - 40 = -5$; $-5 + 90 = 85$,

$$85 - 160 = \boxed{-75}$$

(b) Penalty term of Regression:

formula for ridge penalty term:

$$\frac{\lambda}{2} \sum_{i=1}^{n} w_i^2$$

given $\lambda = 0.6$, $w = [1, -2, 3, -4]$:

Calculating sum of squred weights:-

$$(1)^2 + (-2)^2 + (3)^2 + (-4)^2$$

$$= 1 + 4 + 9 + 16$$

$$= 30$$

now, multiply by λ: $0.6 \times 30 = 18.0$

and now $\frac{\lambda}{2} = \frac{18}{2} = \boxed{9.0}$