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CSIT375 Artificial Intelligence for Cybersecurity **quiz2 Q2**

FORMULA FOR LOGISTIC REGRESSION

1. compute weighted sum

$$\text{weighted sum} = \underset{\theta_0}{\text{bias}} + (\underset{\theta_1}{\text{weight 1}} \times \underset{x_1}{\text{feature 1}}) + (\underset{\theta_2}{\text{weight 2}} \times \underset{x_2}{\text{feature 2}}) + \dots$$

2. apply sigmoid function

$$\text{probability} = 1 \div \left[1 + e^{-(\text{weighted sum})}\right]$$

(a)

$$\text{weighted sum} = (-6) + (0.05 \times 40) + (1 \times 3.5)$$
$$= -0.5$$
$$\text{probability} = 1 \div \left[1 + e^{-(-0.5)}\right]$$
$$= 0.3775$$
$$= 37.75\% //$$

probability is 37.75%

(b)

find weighted sum:

$$0.5 = 1 \div \left[1 + e^{-(\text{weighted sum})}\right]$$
$$0.5\left[1 + e^{-(\text{weighted sum})}\right] = 1$$
$$0.5\, e^{-(\text{weighted sum})} = 0.5$$
$$e^{-(\text{weighted sum})} = 1$$
$$\text{weighted sum} = 0$$

find no. of hours using weighted sum formula

$$0 = -6 + (0.05 \times \text{hours}) + (1 \times 3.5)$$
$$\text{hours} = \frac{2.5}{0.05}$$
$$= 50 //$$

student requires 50 hours