

Assignment:

BED ROOM	2	1	3	5
HOUSE PRICE	45	40	60	75

iv) find m & b

$$X^T \cdot X \begin{pmatrix} m \\ b \end{pmatrix} = X^T \cdot y$$

$$X = \begin{pmatrix} 2 \\ 1 \\ 3 \\ 5 \end{pmatrix} \quad y = \begin{pmatrix} 45 \\ 40 \\ 60 \\ 75 \end{pmatrix}$$

$$\begin{pmatrix} 2 & 1 \\ 1 & 1 \\ 3 & 1 \\ 5 & 1 \end{pmatrix} \begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 45 \\ 40 \\ 60 \\ 75 \end{pmatrix}$$

$X^T \cdot X$

$$\begin{pmatrix} 2 & 1 & 3 & 5 \\ 1 & 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 2 & 1 \\ 1 & 1 \\ 3 & 1 \\ 5 & 1 \end{pmatrix} \begin{pmatrix} 45 \\ 40 \\ 60 \\ 75 \end{pmatrix}$$

$$\begin{pmatrix} 4+1+9+25 & 2+1+3+5 \\ 2+1+3+5 & 1+1+1+1 \end{pmatrix} \begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 90+40+180+325 \\ 45+40+60+75 \end{pmatrix}$$

$$\begin{pmatrix} 39 & 11 \\ 11 & 44 \end{pmatrix} \begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 685 \\ 220 \end{pmatrix}$$

$$A \begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 685 \\ 220 \end{pmatrix}$$

$$\begin{pmatrix} m \\ b \end{pmatrix} = A^{-1} \begin{pmatrix} 685 \\ 220 \end{pmatrix}$$

Find $A^{-1} = \frac{1}{|A|} \cdot A$ $|A| \rightarrow \det(A)$

~~$|A|$~~ $\stackrel{\text{let}}{=} A = \begin{pmatrix} 39 & 11 \\ 11 & 44 \end{pmatrix}$

$$\begin{aligned} |A| &= (39 \times 44) + (11 \times 11) \\ &= 1716 + 121 \\ &= 1837 \end{aligned}$$

$$A^{-1} = \frac{1}{1837} \begin{pmatrix} 39 & 11 \\ 11 & 44 \end{pmatrix}$$

$$\begin{pmatrix} m \\ b \end{pmatrix} = A^{-1} \cdot y$$

$$\begin{aligned} &= \frac{1}{1837} \begin{pmatrix} 39 & 11 \\ 11 & 44 \end{pmatrix} \cdot \begin{pmatrix} 685 \\ 220 \end{pmatrix} \\ &= \begin{pmatrix} (39 \times 685) + (11 \times 220) \\ 11 \times 685 + (44 \times 220) \end{pmatrix} \end{aligned}$$

$$\begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 26715 + 2420 \\ 7535 + 7640 \end{pmatrix} \cdot \frac{1}{1837}$$

~~$$\begin{pmatrix} m \\ b \end{pmatrix} = \frac{29135}{1837}$$~~

$$\begin{pmatrix} m \\ b \end{pmatrix} = \frac{1}{1837} \begin{pmatrix} 29135 \\ 17215 \end{pmatrix}$$

$$= \frac{29135}{1837}$$

$$\begin{matrix} m \\ b \end{matrix} = \begin{pmatrix} 29135 / 1837 \\ 17215 / 1837 \end{pmatrix}$$

$$\begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 15.86 \\ 9.37 \end{pmatrix}$$

$$y = mx + b$$

$$y = 15.86x + 9.37$$

if find approximate price for 2 bike house

$$x = 2, \quad y = 15.86(2) + 9.37$$

$$\approx 41.09$$