

# Linear Regression Practice Question

Shiva Agarwal

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Is there a relationship between student's performance on their 'x' midterm scores and the final Exam Score 'y'?

a ) Create a scatter Plot from the data

b ) Find the regression straight Line  $y = ax + b$

C ) If a student earns an score of 87 what is their predicted final exam score? Find  $\hat{y}$  for  $x = 87$

$x$	$y$	$xy$	$x^2$
80	76	6080	6400
92	94	8648	8464
82	85	6970	6724
60	58	3480	3600
67	70	4690	4489
75	72	5400	5625
86	87	7482	7396
88	86	7568	7744
100	96	9600	10000
95	95	9025	9025
$\sum x$ 825	$\sum y$ 819	$\sum xy$ 68943	$\sum x^2$ 69467

Table 1: Data Table

The value of  $a$  can be calculated using the formula:

$$a = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

Substituting the given values:

$$\begin{aligned} a &= \frac{10(68943) - (825)(819)}{10(69467) - (825)^2} \\ a &= \frac{689430 - 675675}{694670 - 680625} \\ a &= \frac{13755}{14045} \end{aligned}$$

So,  $a$  is approximately equal to 0.9793.

The value of  $b$  can be calculated using the formula:

$$b = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2}$$

Substituting the given values:

$$\begin{aligned} b &= \frac{(819)(69467) - (825)(68943)}{10(69467) - (825)^2} \\ b &= \frac{56893473 - 56877975}{694670 - 680625} \\ b &= \frac{15498}{14045} \end{aligned}$$

So,  $b$  is approximately equal to 1.1034.

Therefore, the regression equation is  $\hat{y} = 0.9793x + 1.1034$ .