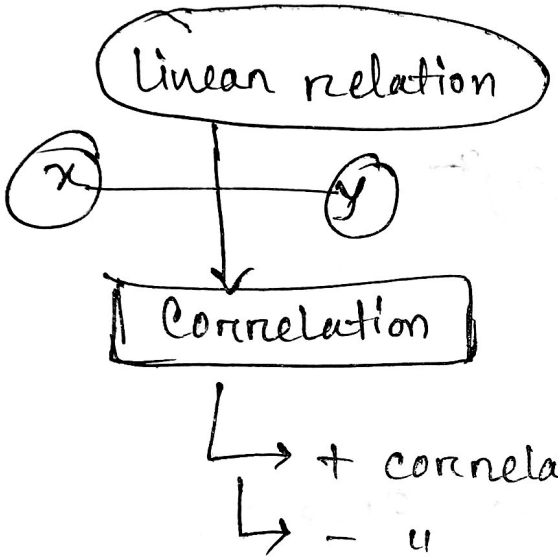
18/07/17

Correlation

↓

Linear Relation



Positive correlation → x এর মান বাড়লে y এর মান বাড়বে, x কমলে y ও কমবে। x ও y একই দিকে direction.

Negative correlation → x বৃদ্ধি পেলে y কমে যাবে। x ও y এর direction opposite.

Karl pearson correlation coefficient

$$r = \frac{\sum_{i=1}^{n}[(x_i - \bar{x})(y_i - \bar{y})]}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

$r = (-1 \text{ to } +1)$ → এই Range এ থাকে,

0 এর কাছাকাছি থাকলে কোন correlation নেই,

-1 এর কাছাকাছি Perfect Neg correlation

+1 " " Postive "

r = 0 to 0.2	very week / very low
0.21 to 0.4	weak / low
0.41 to 0.6	Moderate / Median
0.61 to 0.8	Highly moderate
0.81 - 0.999	very high

$r = 0.75$ → ~~Positively~~ highly moderate (Positive ~~which is positive~~ C.R)

$r = -0.75$ → ~~negatively~~ " " " (Neg C.R) which is negative.

⇒ How we can find out the correlation coefficient?

x_i Price	y_i Profit
10	8
5	7
20	15
8	5

⇒ is there any correlation between ~~between~~ price & Profit?

⇒ interprete (বর্ণনা) your result?

✓ value টা কোন scale এ আছে সেটা আলোচনার বর্ণনা করতে হবে।

x_i Price	y_i Profit	$(x_i-\bar{x})$	$(y_i-\bar{y})$	$(x_i-\bar{x})(y_i-\bar{y})$	$(x_i-\bar{x})^2$	$(y_i-\bar{y})^2$
10	8	−0.75	−0.75	0.56	0.56	0.56
5	7	−5.75	−1.75	10.06	33.06	3.06
20	15	9.25	6.25	57.81	85.56	39.06
8	5	−2.75	−3.75	10.31	7.56	~~40~~ 14.06
$\bar{x}$ = 10.75	$\bar{y}$ = 8.75			78.74	~~46.74~~ 126.74	~~56.74~~ 56.74 ~~63.22~~

$$r = \frac{\sum_{i=1}^{n}\left[(x_i-\bar{x})(y_i-\bar{y})\right]}{\sqrt{(x_i-\bar{x})^2(y_i-\bar{y})^2}}$$

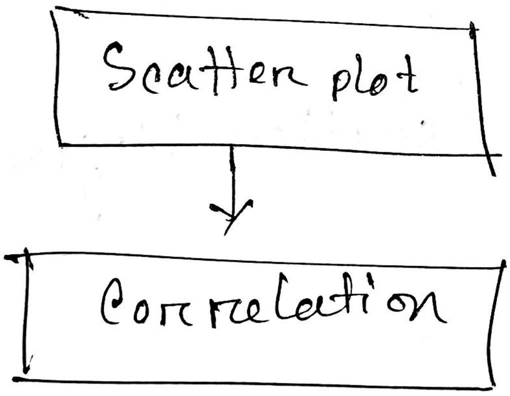
$$\therefore r = \frac{78.74}{\sqrt{126.74 \times 56.74}} = 0.928 = 0.93$$

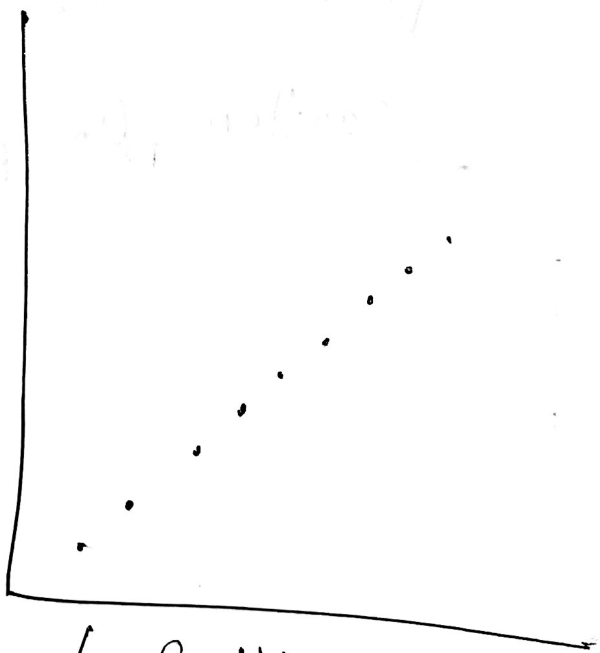
ans 1 এর
চেয়ে বড় কখনোই
আসবে না।

So, There is very high Linear relation/ correlation between Price and profit

↳ [Neg আসবে last এ which is Negative দিকে যাবে -হবে]

Linear relation এর জন্য একটা special graph draw করি → scatter plot

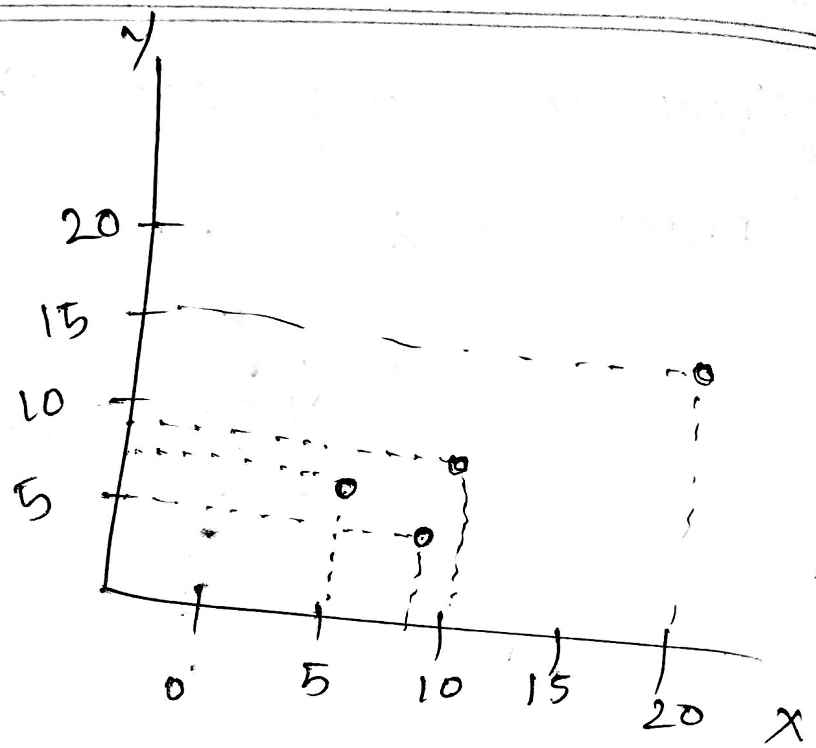




(Positive correlation)

(Negative correlation)

Price (x_i)	Profit (y_i)
10	8
5	7
20	15
8	5



⇒ Scatter plot এ কোনো ট্রেন্ড line draw করতে পারবো না। Just Point গুলো highlight করবো।

Scatter ~~plo~~ plot / scatter diagram