It is the statistical took to measure the average relationship between two or mare variables in terms of others.

In segression analysis one of the two variables, say + is segreted as on interestent variable, the other variable y as the dependent variable environces.

We are interested in the dependence of y on it of the defendence of y on it of y on it of the defendence of y on it of y on its of y on

For Frontle 1 (7) defendence of blood pressure (y) on the age (+)

(ii) telentence of weight of a person (y) on the age (x)

In general, we specify x, x2, --, xn and then observe the corresponding values y, y2, -- In, so that we get a birotable sample (+i, ti); i=1,2,3, --n, we are enterested an funding, a mathematical measure of the overage relationship between the the two (or rare in case of multivariate hata) variables in terms of the original units of the data.

Let X and Y be two employ variables, which are jointly distributed. For the regression equation of y on X & terret or

MYIX = E(YIX=x)

A MAIX = $\int_{\Sigma} \frac{1}{A} \frac{1}{$

where p(x) & f(x) are neighbor support and pdf of landon valiable x respectively.

Similarity fre regression equation of x on y

x = E(x|y=y)

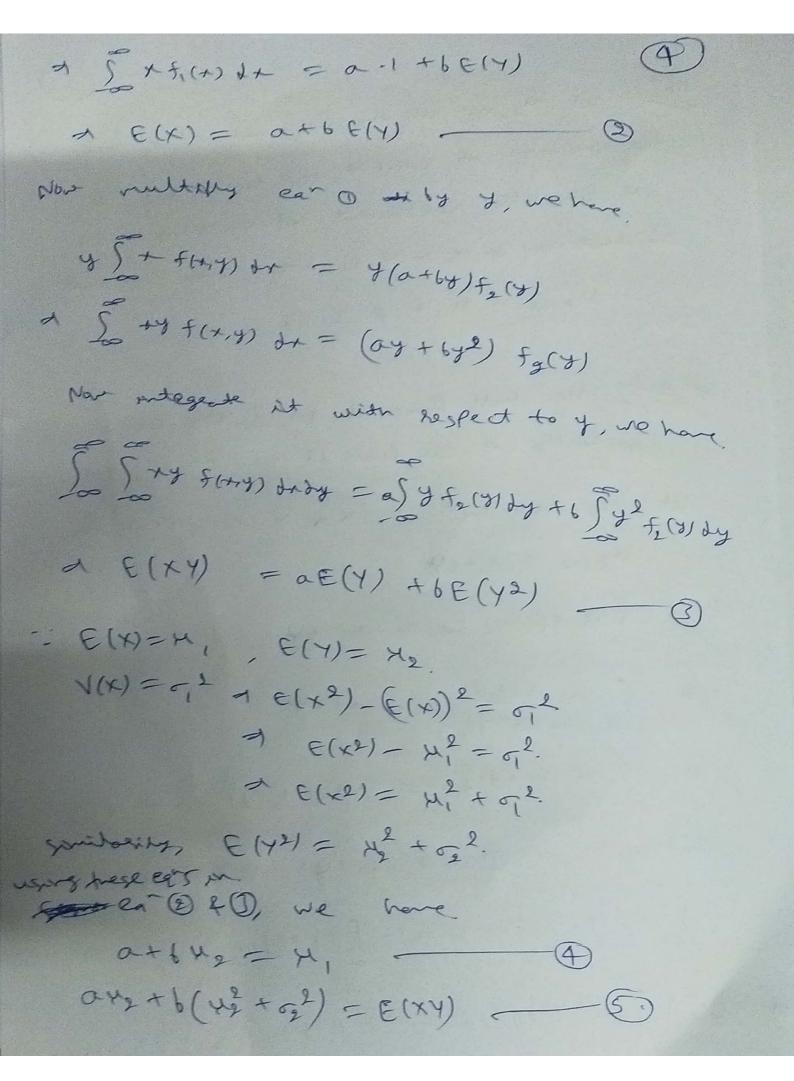
 $A \times XY = \int_{-\infty}^{\infty} \frac{1}{P_2(Y)} fx dx dx$ $\int_{-\infty}^{\infty} \frac{1}{f_2(Y)} dx, fx cont x case$

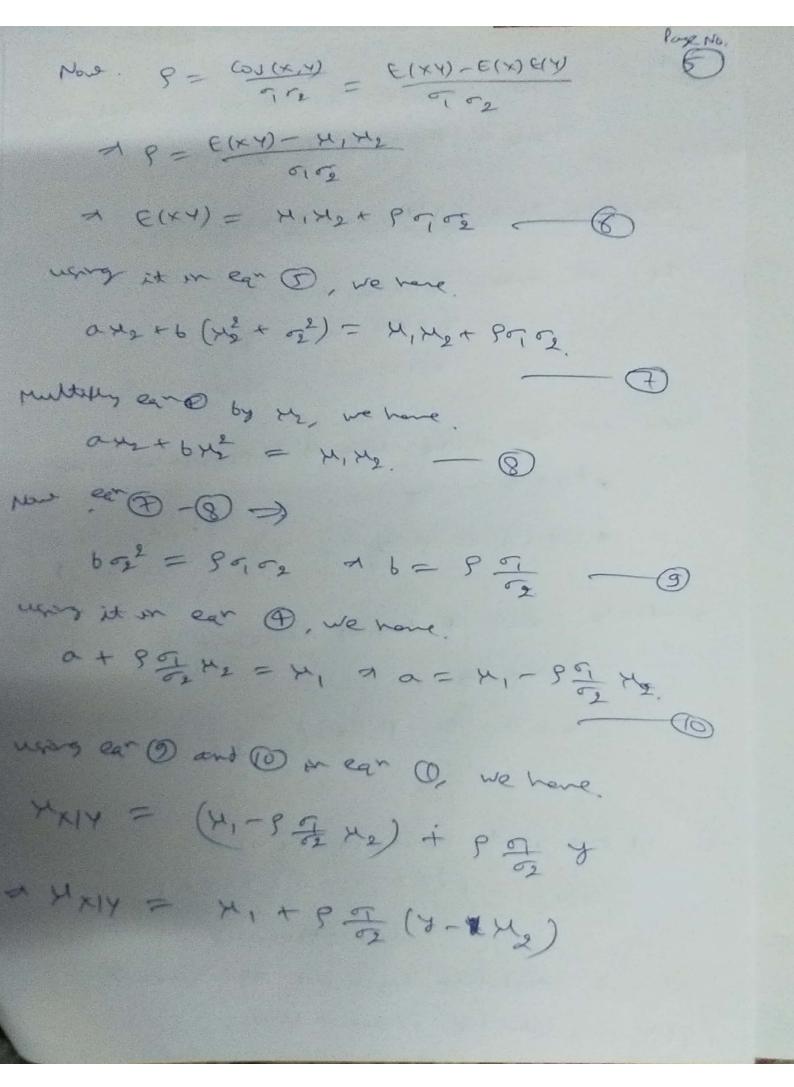
shere pean is purf of discrete 1.v. x and f_(4) is perf of continuous 2.v. X.



Let Y_1, Y_2 are the mean and σ_1^2, σ_2^2 are the variances of X and Y respectively and S is the correlation coefficient between X and Y. If the regression of X on Y is linear, then place that $Y_1 = Y_1 + S = \frac{\sigma_1}{\sigma_2} (Y_1 - Y_2)$

whose we shall love it for cont's case smilarly we can leave it for tisket case. let regression ear of Xon Y is Ineal, then YXIY = a+by 2 5 x f(x/4) dn = a+ by 7 5 + f(+,4) h = a+by $\int_{\infty}^{\infty} \chi f(x,y) dx = (\alpha + 6y) f_2(y) -$ Integrate ear O w. l. fo = y! we have 5 S x + (+, y) tr dy = S (a+by) f (8) dy





Note:

If the legission of Yon X is horeal then

HYIX = H2 + 9 = (X-H) fegression lives (Alternative Definition) If we take, $E(x) = x_1 = \overline{x}$ $\xi(x) = x_2 = \overline{y}$ $V(x) = \sigma_x^2, \quad V(y) = \sigma_y^2.$ then the ear of the line of Regulation of y on # 4-5 = 964 (x-7) [Sust relace]
HYIX by y
]. grandality, ear of line of legression of x on y is x-7 = 9 5x (y-y) Q. Let the joint fingity of (X,Y) IT f(4,y) = { 8+4, 0 < + < 4 < 1 } o, etnemise. (a) find callelation coefficient of x and y (6) find both the Regression lines.

So (a) Margard Pof's $f_{1}(+) = \int_{1}^{1} 8 + y \, dy = \left(4 + y^{2}\right)_{x}^{x}$ $f_{1}(x) = \frac{1}{2}$ $= 4x - 4x^{2}$ $= 4x - 4x^{2}$ $= 4x^{2}y)^{2} = 4y^{3}$ $= 4y^{3}$ $= 6x^{2}y = 1$ E(Y)= 5 \ \ \((443) \) \ \ = 4/5 *(+(x+)= \(\frac{1}{2} \tau \(\frac{1}{2} \tau \) \dr = \(\frac{1}{2} \) E(Y2) = 5 42 (443) +y = 2/3 : $V(x) = E(x^2) - (E(x))^2 = \frac{1}{2} - \frac{69}{245} = \frac{11}{225}$ ·· 5x = Juin = 15 Juin V(Y)= E(Y2)-(E(Y))2= 2/3-16=25=25 E(XY) = 5' Say 8xy) trdy. = 5' 5' 8x2 y2 drdy. $=\frac{5}{845}$ $=\frac{846}{(3)6)} = \frac{8}{18} = \frac{4}{9}$ Now, $g = E(XY) - E(Y)E(Y) = \frac{4/9 - (8/5) - (4/5)}{4/5}$ $= \frac{225 \left(\frac{4}{9} - \frac{32}{45}\right)}{\sqrt{66}} = \frac{4}{\sqrt{66}} = 0.49$

Now Regression has of Youx is My1x = 42+ 9 = (x-41) * 44/1X = 0-8+ 0-267 (05X-0-53) fegression bine of X on Y 15 YXIY = 4,+ 9 = (Y-42) 14x14 = 0.53 + 0.898 (7 - 0.8)