$$f(x) = \begin{cases} 1/4 & -1 < x < 3 \\ 0 & o/w \end{cases}$$

$$P(x<0) = \int_{-\infty}^{0} f(x)\,dx = \int_{-1}^{0} \frac{1}{4}\,dx = \frac{1}{4}(x)_{-1}^{0} = \frac{1}{4}$$

CHAPTER - 2

Multiple Correlation

total 3 variables

Dependent Variable — 1 DV

Independent Variable — 2 IV

$R_{1.23}$ — $1 \to D$ — 2, 3 I.V $= \sqrt{\frac{(r_{12})^2 + (r_{13})^2 + 2r_{12}r_{13}r_{23}}{(1-r_{23})^2}}$

$R_{2.13}$ — $2 \to D$ — 1, 3 I.V $= \sqrt{\frac{(r_{12})^2 + (r_{23})^2 + 2r_{12}r_{13}r_{23}}{(1-r_{13})^2}}$

$R_{3.12}$ — $3 \to D$ — 1, 2 I.V $= \sqrt{}$

$$\boxed{\sqrt{\frac{(r_{13})^2 + (r_{23})^2 - 2r_{12}r_{13}r_{23}}{(1-r_{12})^2}}}$$

Having two variables

Q The following zero order correlation coefficients are given:
$r_{12} = 0.98$ $r_{13} = 0.44$ and $r_{23} = 0.54$

Calculate multiple correlation coefficient treating first variable as dependant & second & III as independant

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Ans:- $R_{1.23} = \sqrt{\frac{(r_{12})^2 + (r_{13})^2 - 2 r_{12} r_{13} r_{23}}{1 - (r_{23})^2}}$

& so on.

$= 0.99$ Ans

Q x_1, x_2, x_3 are three variates measured from their means with $N = 10$, $\Sigma x_1^2 = 90$, $\Sigma x_2^2 = 160$, $\Sigma x_3^2 = 40$, $\Sigma x_1 x_2 = 60$, $\Sigma x_2 x_3 = 60$, $\Sigma x_3 x_1 = 40$.
Calculate the multiple correlation coefficient $R_{1.23}$.

Ans:- R = correlation

By Karl Pearson;

$R_{12} = \frac{\Sigma x_1 x_2}{\sqrt{\Sigma x_1^2 \Sigma x_2^2}}$ -- & so on for R_{13}, R_{23}

Partial Correlation

$$\boxed{r_{12.3} = \frac{r_{12} - r_{13} r_{23}}{\sqrt{1-(r_{13})^2}\sqrt{1-(r_{23})^2}}}$$

same for others

The correlation and regression between only two variables eliminating the effect of other variable is called partial correlation & partial regression

Eqⁿ of plane of regression of X_1 on X_2 and X_3

$$\boxed{X_1 = a + b_{12.3} X_2 + b_{13.2} X_3}$$

Remember:- for plane of regression in case of multiple variables, ($a=0$)

$\Rightarrow$ $\boxed{X_1 = b_{12.3} X_2 + b_{13.2} X_3}$ Thus the coefficients $b_{12.3}$ and $b_{13.2}$ are known as the partial regression coeff of X_1 ~~and~~ on X_2 and X_1 on X_3 resp.

Estimated value of X_1 on X_2 and X_3 is given

$$\boxed{e_{1.23} = b_{12.3} X_2 + b_{13.2} X_3}$$

The quantity $(X_{1.23} = X_1 - e_{1.23})$ is called error of estimate or residual.

The subscript b4 the dot (.) is known as primary subscript and after the dot secondary subscript.

→ The order of regression coeff is determined by the no. of secondary subscripts.

For eg:- i

$b_{12.34}$, order = 2

X_2 is independent var.

X_1 is dependent variable

Eg. 2 $b_{14.235}$ order = 3

X_4 is independant variable

X_1 is dependent variable

$$b_{12.3} = \frac{\sigma_1}{\sigma_2} \frac{W_{12}}{W_{11}}$$

$$b_{13.2} = -\frac{\sigma_1 W_{13}}{\sigma_3 W_{11}}$$