Important points about Regression coefficients b_{xy} and b_{yx}.

(1) $r = \sqrt{b_{yx} . b_{xy}}$ *i.e.* the coefficient of correlation is the geometric mean of the coefficient of regression.

(2) If, then $b_{xy} < 1$ i.e. if one of the regression coefficient is greater than unity, the other will be less than unity.

(3) If the correlation between the variable is not perfect, then the regression lines intersect at $(\bar{x}, \bar{y})$.

(4) b_{yx} is called the slope of regression line y on x and $\frac{1}{b_{xy}}$ is called the slope of regression line x on y.

(5) $b_{yx} + b_{xy} > 2\sqrt{b_{yx} b_{xy}}$ or $b_{yx} + b_{xy} > 2r$, i.e. the arithmetic mean of the regression coefficient is greater than the correlation coefficient.

(6) Regression coefficients are independent of change of origin but not of scale.

(7) The product of lines of regression's gradients is given by $\frac{\sigma_y^2}{\sigma_x^2}$.

(8) If both the lines of regression coincide, then correlation will be perfect linear.

(9) If both b_{yx} and b_{xy} are positive, the r will be positive and if both b_{yx} and b_{xy} are negative, the r will be negative.

Important Tips

- If $r = 0$, then tanθ is not defined i.e. $\theta = \frac{\pi}{2}$. Thus the regression lines are perpendicular.
- If $r = +1$ or -1, then tan θ = 0 i.e. θ = 0. Thus the regression lines are coincident.
- If regression lines are $y = ax + b$ and $x = cy + d$, then $\bar{x} = \frac{bc + d}{1 - ac}$ and $\bar{y} = \frac{ad + b}{1 - ac}$.
- If b_{yx}, b_{xy} and $r \geq 0$ then $\frac{1}{2}(b_{xy} + b_{yx}) \geq r$ and if b_{xy}, b_{yx} and $r \leq 0$ then $\frac{1}{2}(b_{xy} + b_{yx}) \leq r$.

- Correlation measures the relationship between variables while regression measures only the cause and effect of relationship between the variables.
- If line of regression of y on x makes an angle α, with the +ive direction of X-axis, then $\tan\alpha = b_{yx}$.
- If line of regression of x on y makes an angle β, with the +ive direction of X-axis, then $\cot\beta = b_{xy}$.