

20th. December, 1929.

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Dear Buchanan Smith,

Thanks for the D^2 averages. I do not think the facts will stand out clearly until good steady averages are obtained for all or most of the 25 degrees of kinship.

Does this help?

(i) The sum of the values

$$(x_1 - y)^2, (x_2 - y)^2, \dots, (x_p - y)^2$$

is $p(\bar{x} - y)^2 + S(x - \bar{x})^2$

(ii) The sum of all the pq values $(x - y)^2$, for p values of x and q of y is

$$\begin{aligned} & p \sum_y (\bar{x} - y)^2 + q \sum_x (x - \bar{x})^2 \\ &= pq(\bar{x} - \bar{y})^2 + p \sum_y (\bar{y} - y)^2 + q \sum_x (x - \bar{x})^2 \end{aligned}$$

(iii) The sum of $\frac{1}{2}p(p-1)$ values of the differences of the squares among p values of x is

$$p \sum (x - \bar{x})^2$$

Yours sincerely,