THE RELATION BETWEEN THE MEANS AND VARIANCES, MEANS SQUARED AND VARIANCES IN SAMPLES FROM COMBINATIONS OF NORMAL POPULATIONS

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The distributions of the means and variances of samples from the combinations of normal populations have been discussed in a previous paper.[1] It is known that if the sampled population is not normal the means and variances of samples are not independent.

The present discussion aims to give some idea of the relation between the means and the variances, means squared and variances of samples from a population that is the combination of normal populations. To this end the case of samples of two from such populations is rather completely investigated. Also empirical random sampling results for two special populations are presented.

Suppose that a population is represented by

$$(1) \qquad f(x) = \frac{1}{1+k}\left[\frac{e^{-\frac{1}{2}x^2}}{\sqrt{2\pi}} + \frac{k}{\sigma\sqrt{2\pi}}\, e^{-\frac{1}{2}\frac{(x-m)^2}{\sigma^2}}\right].$$

[1]"Random Sampling from Non-Homogeneous Populations," Metron, Vol. VIII, No. 3 (1930), pp. 1-21.