THE EXTENDED PROBABILITY THEORY FOR THE CONTINUOUS VARIABLE WITH PARTICULAR APPLICATION TO THE LINEAR DISTRIBUTION

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The engineering worker is often confronted with the necessity of utilizing a group of quantities concerning whose numerical values it is known only that they lie between definite upper and lower limits. If a number n of specimens is selected from such a group and the sum of the n values taken, intuition rules that there is negligible probability that this sum will be as great as n times the upper limit or as small as n times the lower limit, and that the most probable value must be intermediate between these two extremes. Some assurance is desired regarding the practical limits within which such a sum may be expected to fall. While the distribution of the individual values within their limits may be unknown directly, yet workable inferences frequently may be made from the nature of the quantities. For example, in many manufacturing operations it is economical to turn out items (such as bearing balls, paper condensers, or spacing washers) in large quantities with rather coarse precision. By means of gauges set to limits narrow as compared with the total spread, the product is then selected into bins, and in the operation of assembly a completed article utilizes the material from a single bin. The contents of any such bin clearly may be expected to follow a linear distribution very closely, and if the relative proportions of the product finding their ways into this bin and its immediate neighbors can be learned, the distribution may be specified with practical accuracy. The linear distribution is thus fundamental to a large class of problems.

On several occasions the writer's speculations have led to prob-