

# SYNOPSIS OF ELEMENTARY MATHEMATICAL STATISTICS\*

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## SECTION I. ELEMENTARY STATISTICAL FUNCTIONS

1. *Variates.* Practically all statistical data\* is obtained as the result of observations that endeavor to establish the magnitudes of certain variables. The individual magnitudes that are recorded are termed variates. Thus in computing the average annual rainfall of a region, the variable is rainfall, and the amount of rainfall for any single year is a variate. Likewise, if the bank clearings for the City of New York be under consideration, then the variable is bank clearings, and the clearings for any specified interval is a variate.

2. The *arithmetic mean* of a series of variates is equal to the sum of the variates divided by the number of variates in the series. If  $M_v$  designates the arithmetic mean of the  $N$  variates  $v_1, v_2, v_3, \dots, v_N$ ,

$$(1) \quad M_v = \frac{1}{N}(v_1 + v_2 + \dots + v_N) = \frac{1}{N} \sum v$$

3. The  $n$ th moment of a series of variates is defined as the arithmetic mean of the  $n$ th powers of these variates and is represented by the symbol  $\mu'_{n:v}$ . Thus,

$$(2) \quad \mu'_{n:v} = \frac{1}{N}(v_1^n + v_2^n + v_3^n + \dots + v_N^n) = \frac{1}{N} \sum v^n$$

That is

$$\mu'_{1:v} = \frac{1}{N} \sum v$$

$$\mu'_{2:v} = \frac{1}{N} \sum v^2$$

$$\mu'_{3:v} = \frac{1}{N} \sum v^3$$

\* An abstract of a series of lectures on elementary statistics given by the mathematical statistical staff at the University of Michigan.

1. Observe that the number of variates in a series is denoted by  $N$ , whereas the smaller italic  $n$  is employed as an ordinal number.