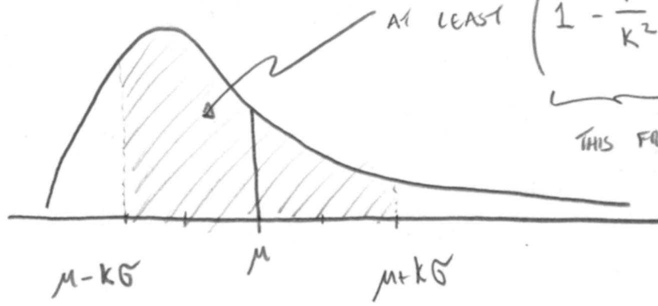
§2.4 On the Practical Significance of Standard Deviation

Tchebysheff's Theorem

Given a number $K \geq 1$, and a set of n measurements, at least $\left[1 - \left(\frac{1}{K}\right)^2\right]$ of the measurements will lie within K standard deviations of their mean.



e.g. if $n = 50$, $\mu = 150$, $s = 10$

then $K = 1 \rightarrow$ at least 0 measurements within 1 S.D.

$140 \leq x \leq 160$

$K = 2 \rightarrow$ at least $\frac{3}{4}$ measurements within 2 S.D.

$130 \leq x \leq 170$

$K = 2.4 \rightarrow$ at least 82.6 % measurements within 2.4 S.D.

$126 \leq x \leq 174$

$K = 3 \rightarrow$ at least $\frac{8}{9} \approx 89\%$ measurements within 3 S.D.

$120 \leq x \leq 180$

TCHEBYSHEFF'S THM APPLIES TO <u>ALL</u> DATA SETS, WITH <u>ANY</u> DISTRIBUTION.

SO, "AT LEAST" CAN SOMETIMES MEAN "MUCH MUCH MORE THAN".

IF DISTRIBUTION IS UNIMODAL (ONE MOUND) & SYMMETRIC,
WE CAN USE <u>EMPIRICAL RULE</u>

$\boxed{\text{NORMAL}}$