WK 1

CHAPTER 1 — DOE Simplifies

BASIC STATISTICS:

2 TYPES OF ERRORS:

- TYPE I – REFERRED TO α RISK
- TYPE II – " " β "

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SYSTEM VARIABLES: CONTROLLABLE FACTORS (X) + UNCONTROLLABLE VARIABLE (Z) = RESPONSE MEASURES (Y)

- FIG. 1-1

HOW DOE SIMPLIFIES DIFFERS FROM SPC – TABLE 1-1

ROLLING 1 DICE, 2 DICE, ..., n DICE CONTINUOUSLY:

- FIG 1-2
- THE MORE DICE THE MORE NORMAL DISTRIBUTION OF AVERAGES

THEOREM: THE TAKING OF AVERAGES REGARDLESS OF ORIGINAL DATA RESULTS IN A NORMAL DISTRIBUTION

MEAN: $\bar{Y} = \frac{\sum Y_i}{n}$

VARIENCE: $s^2 = \frac{\sum_{n}^{n} (Y_i - \bar{Y})^2}{n-1}$ WHERE $n-1$ IS CALLED df

STD. DEVIATION: $S = \sqrt{\frac{\sum (Y_i - \bar{Y})^2}{n-1}}$

STD. DEVIATION OF THE MEANS = STANDARD ERROR OF THE MEAN (SE):

$$SE = S_{\bar{Y}} \approx \sqrt{\frac{s^2}{n}}$$

CONFIDENCE INTERVAL (CI):

$$CI = \bar{Y} \pm t \times SE$$

WHERE t IS TAKEN FROM APPENDIX 1-1. FOR 95% CONFIDENCY LEVEL $t = 2$ (SEE FIG. 1-5)

DO FIG. 1-3 ON EXCEL – ROLLING A PAIR OF DICE

YOUTUBE VIDEOS:

- "t Stats - STATISTICS" (2 VIDEOS)

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

$\bar{x}$ - SAMPLE MEAN
μ - POPULATION MEAN
n - NUMBER OF SAMPLES
s - SAMPLE STD DEVIATION

t - TEST ARE RUN WHEN:
σ - POPULATION STD. DEVIATION UNKNOWN
$n < 30$

GRAPHICAL TEST FOR NORMALITY - TABLE 1-3
FOR ESTABLISHING SCALE - SEE FIG. 1-7 & TABLE 1-2

DO PROBLEMS 1-1 & 1-2 IN EXCEL

YOUTUBE: "STUDENT t TEST"