SUMMARY OF CHAPTERS 1-7

(EMPHASIZING CALCULATOR-RELATED FORMULAS)

FOR SAMPLE **RAW DATA** (E.G. 4, 12, 7, 5, 11, 6, 9, 7, 11, 5, 4, 7) BE ABLE TO COMPUTE

MEAN $\Sigma x / n$

STANDARD DEVIATION $\sqrt{\dfrac{\Sigma x^2 - (\Sigma x)^2 / n}{n-1}}$

MEDIAN

QUARTILES

MODE

RANGE

AND RELATED QUANTITIES (VARIANCE, IQR, COEFFICIENT OF VARIATION)

GROUPED DATA E.G.

AGE	FREQ.
0 - 9	53
10 - 19	42
....	....
80 - 89	2

BE ABLE TO FIND (AN EXTRA COLUMN FOR EACH): CLASS MIDPOINT VALUES (MARKS), BOUNDARIES, RELATIVE FREQUENCIES, CUMULATIVE FREQUENCIES, RELATIVE CUMULATIVE FREQUENCIES,

DISPLAY THE RESULTS IN HISTOGRAM, FREQUENCY POLYGON, OR OGIVE, AND COMPUTE THE CORRESPONDING

MEAN $(\Sigma x \times f)/(\Sigma f)$

STANDARD DEVIATION

$$\sqrt{\frac{(\Sigma x^2 \times f) - (\Sigma x \times f)^2 / (\Sigma f)}{(\Sigma f) - 1}}$$

MEDIAN AND QUARTILES (GRAPHICALLY - FROM OGIVE)

MODE (HIGHEST-FREQUENCY CLASS MIDPOINT VALUE)

PROBABILITY

FOR A GIVEN RANDOM EXPERIMENT, UNDERSTAND THE NOTIONS OF

SAMPLE SPACE (LIST OF ALL POSSIBLE OUTCOMES)

TREE DIAGRAM - BE ABLE TO DRAW IT, WITH CORRESPONDING PROBABILITIES

EVENTS - BE ABLE TO TELL WHEN THEY ARE INDEPENDENT, WHEN EXCLUSIVE

PROBABILITY OF AN EVENT, AND RULES FOR ESTABLISHING IT

COMPLEMENT, INTERSECTION AND UNION OF EVENTS - PROBABILITY RULES

CONDITIONAL PROBABILITY (GIVEN, KNOWING THAT)

WHEN SELECTING A RANDOM STUDENT FROM A TABLE LIKE:

	FRESHMEN	SOPHOMORE	JUN.	SENIOR
MALE	214	197	171	156
FEMALE	255	203	180	169

BE ABLE TO ANSWER ANY PROBABILITY QUESTION (INCLUDING CONDITIONAL), E.G. PROBABILITY OF: MALE, JUNIOR, FEMALE GIVEN SOPHOMORE, JUNIOR OR SENIOR GIVEN FEMALE, NOT SENIOR GIVEN MALE, ETC. ALSO: ARE THE 'SENIOR' AND 'FEMALE' EVENTS INDEPENDENT? 325/1545 × 807/1545 = 0.1099, 169/1545 = 0.1094 (NO)

UNDERSTAND AND BE ABLE TO EVALUATE COUNTING FORMULAS: $n\,!$, $P_{n,r}$ AND $C_{n,r}$.

A RANDOM VARIABLE AND ITS DISTRIBUTION, E.G.

X =	-2	-1	0	1	2
Pr:	0.13	0.19	0.23	0.27	0.18

COMPUTE:

MEAN : = E $x \times p$

STANDARD DEVIATION F $= \sqrt{(\Sigma x^2 p) - \mu^2}$

ANY PROBABILITY, E.G. Pr(-1 < X < 2)

‘COMMON’ DISTRIBUTIONS

BINOMIAL

$$\Pr(X = i) = C_{n,i} \times p^i \times q^{n-i}$$

MEAN: $n \times p$

STANDARD DEVIATION: $\sqrt{n \times p \times q}$

POISSON

8 = $t \times r$

$$\Pr(X=i)=\frac{\lambda^i}{i!}\times e^{-\lambda}$$

MEAN: 8

STANDARD DEVIATION: $\sqrt{\lambda}$

NORMAL DISTRIBUTION

HAS TWO PARAMETERS: MEAN : (ANY NUMBER) AND STANDARD DEVIATION F (ANY POSITIVE NUMBER)

SPECIAL CASE: STANDARD NORMAL, DENOTED *Z* - HAVE TABLES OF PROBABILITIES.

ANY OTHER NORMAL RANDOM VARIABLE *X* CAN BE CONVERTED TO THIS *Z* BY

$$Z=\frac{X-\mu}{\sigma}$$

BE ABLE TO FIND ANY PROBABILITY OF THE TYPE: $\Pr(Z < 3.02)$, $\Pr(|Z-1| < 1.3)$, $\Pr(X > 327)$, $\Pr(-14 < X < 26)$, ETC.

AND REVERSE:

FIND z SUCH THAT $\Pr(Z < z) = 95\%$
OR $\Pr(|Z| < z)$ / $\Pr(-z < Z < z) = 99\%$,
ETC.

ALSO:
FIND x SUCH THAT $\Pr(X < x) = 90\%$
OR $\Pr(X > x) = 30\%$, ETC.

NORMAL APPROXIMATION TO BINOMIAL DISTRIBUTION

WHEN np AND nq ARE BOTH BIGGER THAN 5 (CONTINUITY CORRECTION).

CENTRAL LIMIT THEOREM

SAMPLING DISTRIBUTION OF $\overline{x}$ IS APPROXIMATELY NORMAL, WHEN $n > 30$

ITS MEAN IS :, ITS STANDARD DEVIATION (ERROR) EQUALS $\sigma/\sqrt{n}$

WE CAN COMPUTE: $\Pr(\bar{x} < 136.4)$ ETC.

(SAMPLE TOTAL = $n \times \bar{x}$)

WHEN POPULATION IS NORMAL, $\bar{x}$ IS EXACTLY NORMAL FOR ANY n

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SAMPLE PROPORTION $\hat{p}$

(= RELATIVE FREQUENCY OF OBSERVED ‘SUCCESSES’) IS, WHEN $np > 5$ AND $nq > 5$, APPROXIMATELY NORMAL, WITH THE MEAN OF p AND STANDARD DEVIATION (ERROR) EQUAL TO $\sqrt{\dfrac{pq}{n}}$