Key Statistical Concepts Summary Sheet

Key Terms

Deviation	The distance between the mean and a particular data point in a given distribution.
Mean	The average score within a distribution.
Median	The center score in a distribution.
Mode	The most frequent score in a distribution.
Bell curve	Normal Distribution is shaped like a bell.
Central Tendency	Indicate the centre of a distribution.
Confidence Level	The specific probability of obtaining some result from a sample below which the relationship will be regarded as statistically significant .
Correlation	Measures the degree of relationship between pairs of interval variables in a sample. The range of correlation is from -1.00 to zero to +1.00.
Causality	The relation between cause and effect.
ANOVA	**(Analysis of Variance)** A method of statistical analysis broadly applicable to a number of research designs, used to determine differences among the means of two or more groups on a variable.
Sample	The population researched in a particular study. Usually, attempts are made to select a "sample population" that is considered representative of groups of people to whom results will be generalised.
Population	The target group under investigation, Samples are drawn from populations.
Standard Deviation	A term used in statistical analysis. A measure of variation that indicates the typical distance between the scores of a distribution and the mean; it is determined by taking the square root of the average of the squared deviations in a given distribution.

Key Formulas

Statistic	Formula	Used For
Sample mean (average)	$\bar{x} = \frac{\sum x}{n}$	Measure of centre; affected by outliers
Median	*n* odd: middle value of ordered data *n* even: average of the two middle values	Measure of centre; not affected by outliners
Sample standard deviation	$s = \sqrt{\frac{\sum (x-\bar{x})^2}{n-1}}$	Measure of variation; “average” distance from the mean
Correlation coefficient	$r = \frac{1}{n-1}\sum \frac{(x-\bar{x})(y-\bar{y})}{s_x s_y}$	Straight and direction of linear relationship between *X* and *Y*

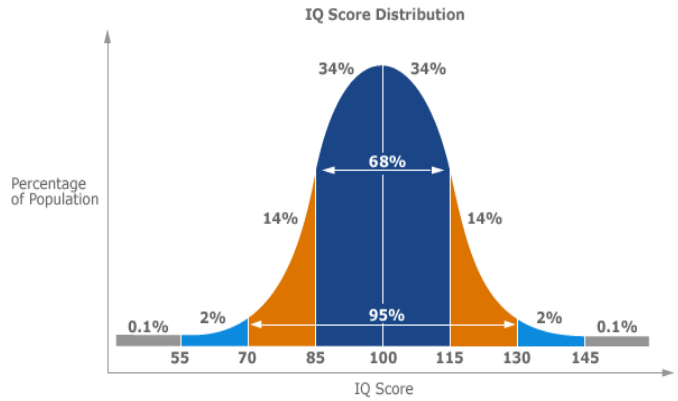
Notations Used

In general, capital letters refer to population attributes (i.e., parameters) and lower-case letters refer to sample attributes (i.e., statistics). For example:

P	refers to a population proportion	***p***	to a sample proportion
X	refers to a set of population elements	***x***	to a set of sample elements
N	refers to population size	***n***	to sample size

Main Concepts

Bell curve



- **Dark blue** is less than one standard deviation from the mean. For the normal distribution, this accounts for **68.27%** of the set, while two standard deviations from the mean (**orange and dark blue**) account for **95.45%.**
- Three standard deviations (light blue, orange, and dark blue) account for **99.73%.**
- **68-95-99.7 rule** — or **three-sigma rule,** or **empirical rule** states that for a normal distribution, nearly all values lie within 3 standard deviations of the mean.

Statistical Symbols

μ refers to a population mean; and ***x***, to a sample mean.
σ refers to the standard deviation of a population; and **s,** to the standard deviation of a sample.
Hypothesis Testing
$\mathbf{H_0}$ refers to a null hypothesis.
$\mathbf{H_1}$ or $\mathbf{H_a}$ refers to an alternative hypothesis.
α refers to the significance level.
B refers to the probability of committing a Type II error.

Typical Question

A sample of the variable x assumes the following values: 9 11 13 3 7 2 8 9 6 10

Compute: (a) n (b) $\sum x$ (c) $\overline{x}$ (d) s (e) s^2 (f) median & mode (h) range CV

(a) n = 10

(b) $\sum x = 78$

(c) $\overline{x} = \frac{\sum x}{n} = \frac{78}{10} = 7.8$

(d) $s = \sqrt{\frac{\sum x^2 - n\overline{x}^2}{n-1}} = \sqrt{\frac{714 - 608.4}{9}} = \sqrt{11.73} = 3.43$

(e) $s^2 = 11.73$

(f) P(med) = $\frac{n+1}{2}$ th score = $\frac{10+1}{2}$ th score = 5.5th score

med = 5.5th score = $\frac{5thscore + 6thscore}{2} = \frac{8+9}{2} = 8.5$

(g) mode = 9

(h) range = highest value - lowest value = 13 - 2 = 11

(i) coefficient of variation (CV) = $\frac{s}{\overline{x}} = \frac{3.43}{7.8} = 0.44$

Student Learning Centre
Registry Building Annexe

Tel: 61-8-8201 2518
E-mail: slc@flinders.edu.au

Internet: http://www.flinders.edu.au/SLC
Postal: PO Box 2100, Adelaide, SA 5001

CRICOS Provider No: 00114A