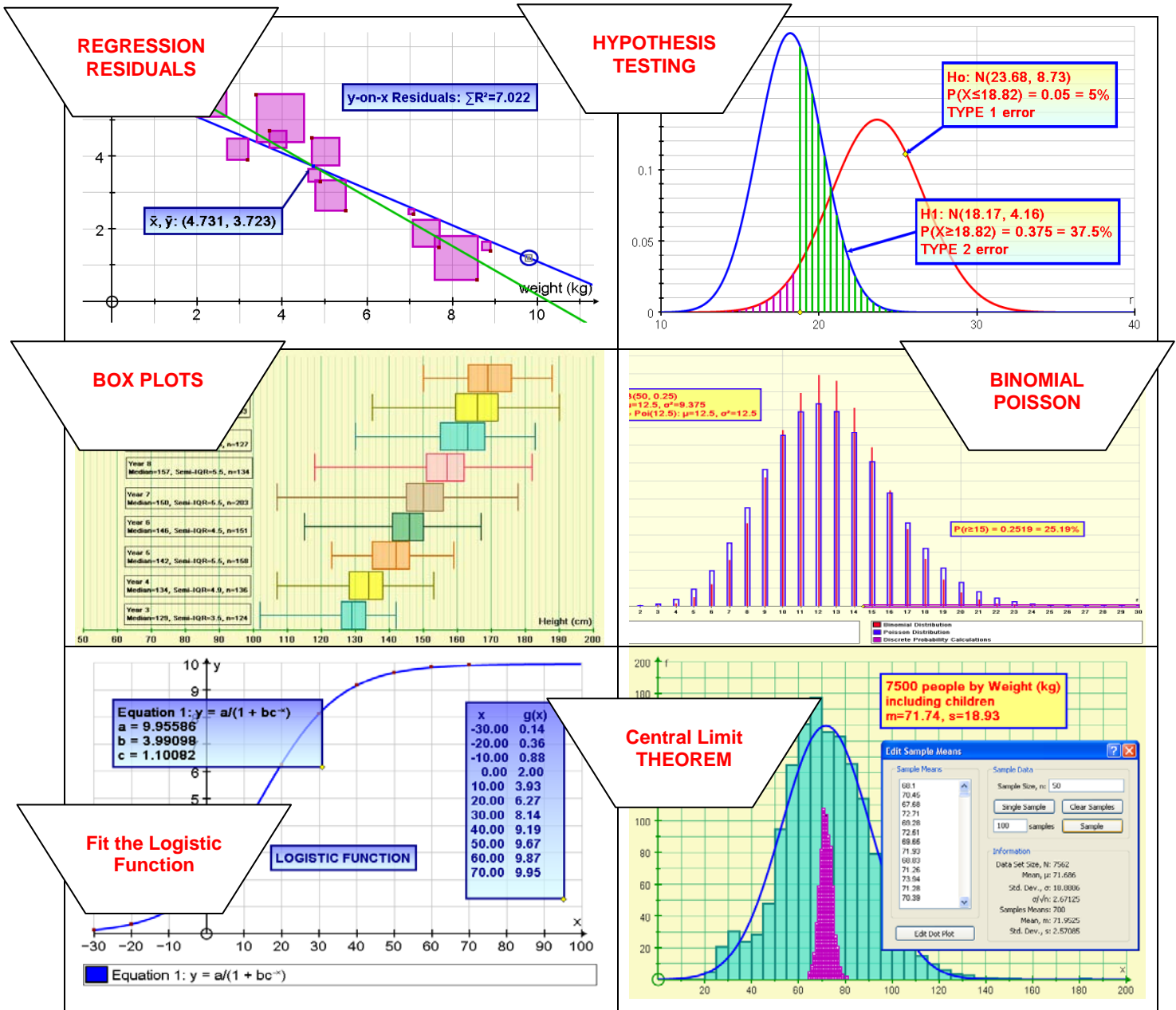


Autograph

version 3

and AP STATISTICS

Autograph is spectacular dynamic software from the UK that allows teachers to visualise many of the mathematical topics that occur in the AP STATISTICS course.



THE LEARNING TEAM

200 Business Park Drive, Suite 303, Armonk, NY 10504, USA

Tel: +1 914 219 5608

Contact: Sebastian Cervantes

www.learningteam.org/autograph

Fax: +1 914 273 0936

sales@learningteam.org

USA: Topic Outline for AP STATISTICS

with references to Autograph



AUTOGRAPH PAGE

=====

I. EXPLORING DATA; DESCRIBING PATTERNS AND DEPARTURES FROM PATTERNS

A. Graphical displays of distributions of univariate data

- **dotplot, stemplot, histogram, cumulative frequency plot**
- **Center and spread**
- **Clusters and gaps**
- **Outliers and other unusual features**
- **Shape**



STATISTICS



STATISTICS

B. Summarizing distributions of univariable data

- **Measuring center; median, mean**
- **Measuring spread; range, interquartile range, standard deviation**
- **Quartiles, percentiles, standardized scores (z-scores)**
- **Using boxplots**
- **The effect of changing units on summary measures**



STATISTICS



STATISTICS

C. Comparing distributions of univariate data

- **dotplots, back-to-back stem plots, parallel boxplots**
- **Comparing center and spread; within group, between group**
- **Comparing clusters and gaps**
- **Comparing outliers and other unusual features**
- **Comparing shapes**



STATISTICS



STATISTICS

D. Exploring bivariate data

- **Analyzing patterns in scatterplots**
- **Correlation and linearity**
- **Least-square regression line**
- **Residual plots, outliers and influential points**
- **Transformations to achieve linearity; logarithmic and power transformations**



2D



2D

E. Exploring categorical data

- **Frequency tables and bar charts**
- Marginal and joint frequencies for two-way tables
- Conditional relative frequencies and association
- Comparing distributions using bar charts



STATISTICS

AP STATISTICS

AUTOGRAPH PAGE

II. SAMPLING AND EXPERIMENTATION; PLANNING AND CONDUCTING A STUDY

A. Overview of methods of data collection

- Census
- Sample survey
- Experiment
- Observational study

B. Planning and conducting surveys

- Characteristics of a well-designed and well-conducted survey
- **Populations, samples and random selection**
- Sources of bias in sampling and surveys
- Sampling methods, including simple random sampling, stratified random sampling and cluster sampling

C. Planning and conducting experiments

- Characteristics of a well-designed and well-conducted experiment
- Treatments, control groups, experimental units, random assignments and replication
- Sources of bias, including placebo effect and blinding
- Completely randomized design
- Randomized block design, including matched pairs design

D. Generalizability of results and types of conclusions that can be drawn from observational studies, experiments and surveys

III. ANTICIPATING PATTERNS; EXPLORING RANDOM PHENOMENA USING PROBABILITY AND SIMULATION

A. Probability

- **Interpreting probability**, including long-run relative frequency interpretation
- “Law of Large Numbers” concept
- Additional/ multiplication rule, conditional probability and independence
- **Discrete random variables and their probability distributions, including binomial and geometric**
- **Simulation of random behavior and probability distributions**
- **Mean (expected value) and standard deviation of a random variable, and linear transformation of a random variable**

B. Combining independent random variables

- **Notion of independence versus dependence**
- **Mean and standard deviation for sums and differences of independent random variables**

 STATISTICS

Extras: “2-dice”

 STATISTICS

 STATISTICS

 STATISTICS

AP STATISTICS

AUTOGRAPH PAGE

C. The normal distribution

- **Properties of the normal distribution**
- Using tables of the normal distribution
- **The normal distribution as a model for measurements**



D. Sampling Distributions

- **Sampling distribution of a sample proportion**
- **Sampling distribution of a sample mean**
- **Central Limit Theorem**
- Sampling distribution of a difference between two independent proportions and means
- **Simulation of sampling distributions**
- T-distribution
- Chi-square distribution



IV. STATISTICAL INFERENCE; ESTIMATING POPULATION PARAMETERS AND TESTING HYPOTHESES

A. Estimation (point estimators and confidence intervals)

- Estimating population parameters and margins of error
- Properties of point estimators, including unbiased and variability
- Logic, meaning and properties of confidence level and confidence intervals
- Large sample confidence interval for a proportion and a difference between two proportions
- **Confidence interval for a mean** and a difference between two means (unpaired and paired)
- Confidence interval for the slope of a least-squares regression line



B. Tests of significance

- **Logic of significance testing, null and alternative hypotheses;** p-values; **one and two-sided tests;** **concepts of Type I and Type II errors;** power
- Large sample test for a proportion/difference between two proportions
- Test for mean and a difference between two means (paired/unpaired)
- Chi-square test for goodness of fit, homogeneity of proportions and independence (one and two-way tables)
- **Test for the slope of a least-squares regression line**



DOUGLAS BUTLER
iCT Training Centre, Oundle, UK

debutler@argonet.co.uk
www.tsm-resources.com; www.autograph-maths.com

Oundle, May 2009