Dominican International School

AP Statistics

Grade Level: 11 & 12
1 Year, 1.5 Credit
SY: 2024-2025

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Overview of AP Statistics:

Course Design

Teaching Statistics provides students with a great simplicity in instruction and activities that is geared to balance learning in school and at home. Students are gathered into small groups to develop their communication and mathematical skills. Essential classroom discussion related to the topics is also enhanced.

Teaching materials for the course come from textbooks, classroom lectures, newspapers, journals, medical newsletters, videos, and the Internet. At the start of the school year, students receive a list of formulas and tables from the course description book. These handouts are used throughout the year for homework and tests. Students will have access to the computer lab for statistics computer tasks. The classroom is equipped with a computer and smart board to assist teacher and student learning.

Project

Projects form a major part of the course. Students need to complete two projects. The two projects are the Survey project and the observational project. These projects require students to design surveys and experiments, gather data, analyze the data numerically and graphically, and apply inferential statistics to draw conclusions about the population. Students write formal reports on their projects using statistical language. The survey project must be completed before the second quarter exam. The observational project must be completed before the fourth quarter exam.

AP Statistics Survey Project

Introduction

AP Statistics has introduced you to the methods and procedures that allow us to explore four themes: Exploring Data, Sampling and Experimentation, Anticipating Patterns, and Statistical Inference. This project is designed to allow you to demonstrate your understanding of the connections between these themes as you carry out a statistical study. Your task is to identify a research question that interests you, design a study to collect data on that question, analyze the data and answer question using an appropriate form on inference.

Objectives

The purpose of this project is to allow you to communicate your understanding of the connections between the four themes of Statistics.

To present a final report that clearly indicates your understanding of data collection, analysis, and inference.

Project Outline

1. Identify a research question

   Phase 1 Team members brainstorm possible survey topics on issues of school interest
   Phase 2 Each team submits a typed proposal describing:
   - Topic/question of interest
   - Background motivation for selecting this topic/question
   - Questions to be included in the survey
   - Methodology
     - The type of sampling procedure do you intend to use – stratified, cluster, SRS or systematic
     - Precise description of your randomization, including labeling
     - When, where, and how you will administer the survey
2. Collect Data – Observational Study or Experiment
   Phase 3 Select your sample and administer your survey
3. Analyze Data – Graphically and Numerically
   Phase 4 Organize, summarize, and analyze your data
4. Perform Inference – Answer Research Question
   Phase 5 Prepare a written report that documents your survey
5. Present Findings
   Phase 6 Class Presentation – a ten minute opportunity to share the critical aspects of the survey project with your classmates. Make it interesting!

Project Expectations

1. Identify a research question
   - Identify a question that is interesting, appropriate, and worthy of investigation.
   - Your question must lend itself to data that can be analyzed using the methods learned in class.
   - You are expected to get your question approved prior to collecting data.
   - Form appropriate hypotheses to guide your investigation.
2. Collect Data – Observational Study or Experiment
   6. Data can come from three sources: A well-designed and carried out survey, observational study, or experiment.
   7. Your data collection procedure should accurately reflect the question being researched.
   8. A full, detailed description of the collection procedure should be included in your final report. Thoroughly describe the procedure in terms of the methodology learned.
   9. Organize raw data in a spreadsheet/document and include in an appendix in your final report.
3. Analyze Data – Graphically and Numerically
   - Analyze raw data using appropriate graphical and numerical procedures.
   - Describe Shape, Outliers, Center, and Spread of datasets in the context of your research question.
   - Include appropriate graphical displays and numeric summaries/descriptions in your final report.
   - Interpret the Exploratory Data Analysis in the context of your research question
4. Perform Inference – Answer Research Question
   - Form appropriate hypotheses to answer your research question.
   - Check appropriate conditions for your test of significance.
   - Show all applicable work: Sampling Distribution, Test Statistic Calculation, p-value, etc.
   - Answer your research question based on your inferential calculations.
5. Present Findings
   - You are expected to write up your findings in a final report. This report should follow a standard academic format and should include a section for each task noted above.
   - You and your partner will present your findings to the class in a 10-15 minute presentation. You are expected to incorporate visuals-PowerPoint, etc.

Primary Textbooks, References, and Resource Materials

1. **David E. Bock**, *STATS Modeling the World*, 5th Edition, AP Edition, Pearson. 2022.

2. **Staff of The Princeton Review,** *AP Statistics Prep.* 20th Edition 2022.

Grading Criteria:

The quarterly grade will be awarded for all student work based on the following criteria:

- ✓ **Class participation and Seatwork** - 3/10 of quarterly grade
- ✓ **Major Projects, Quizzes, and Tests**- 3/10 of quarterly grade
- ✓ **Quarterly Exams**- 3/10 of quarterly grade
- ✓ **Deportment** - 1/10 of quarterly grade

Student Materials Required:

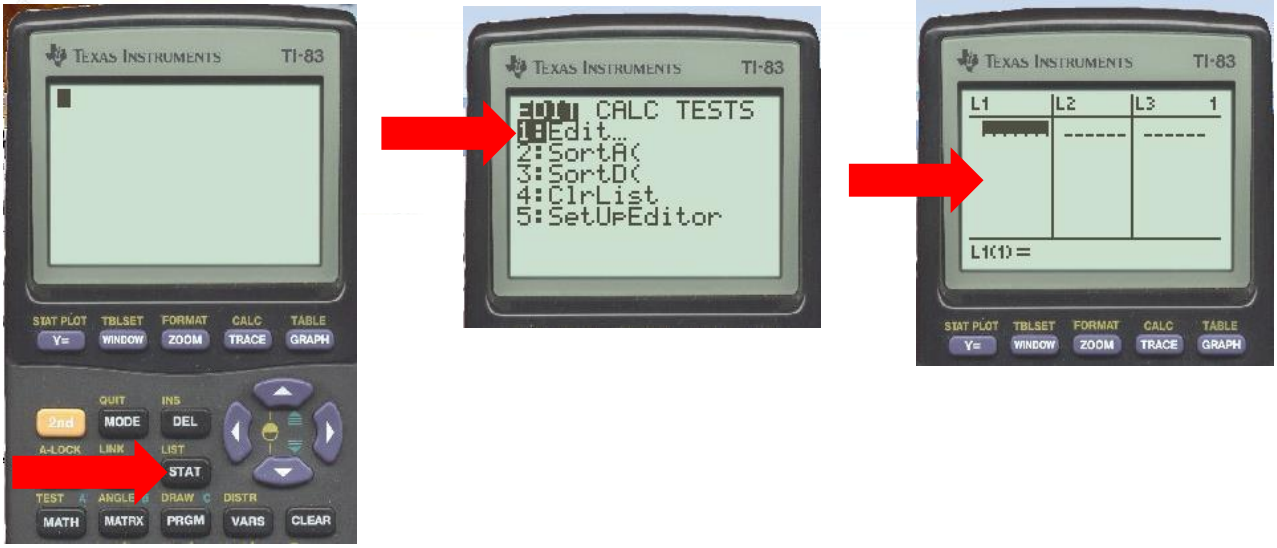
- The students will need to bring a notebook to write their work and lecture
- The students must bring the prescribed calculator and a measuring device like a ruler for making graphs
- Official Calculator: **Ti-nspireCX (non-CAS)**

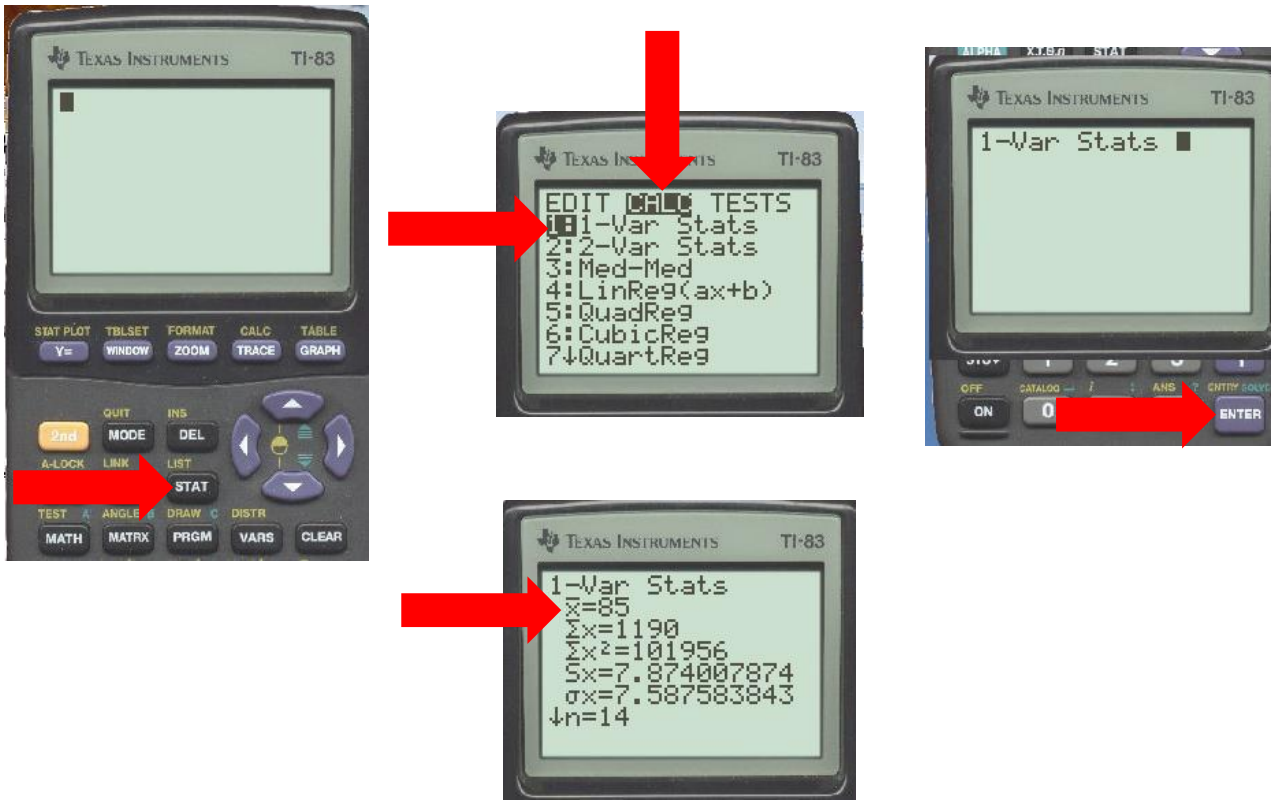
Sample use of a calculator

1.31 Joey's first 14 quiz grades in a marking period were

86	84	91	75	78	80	74	87	76	96	82	90	98	93

(a) Use the formula to calculate the mean. Check using "one-variable statistics" on your calculator.





AP College Board

Log in at: myap.collegeboard.org

Classroom Expectations:

1. Be on time to class; be seated **before** the bell rings.
2. Wear your uniform neatly.
3. Use English at all times.
4. Come prepared with books, assignments, and supplies and without gum, food, or drink (a sealable water bottle is okay).
5. Be respectful of others (especially when speaking), and of school property.
6. Do your best and participate.
7. Ask permission before leaving the class; take a hall pass.
8. Wait for the bell to ring before you leave class.

Homework/Seatwork rules

1. The students may NOT copy from classmates
2. The students are allowed to help each other verbally.
3. The students are NOT allowed to do the work, partially or entirely, for other students.

Discipline:

1. Verbal warning, second reminder (if needed)
2. Write-Up and then refer to the Discipline Office.
3. Parent-Teacher conference.

Course Outline and Content

1st Semester

Topic	Week	Description
Introduction to Statistics	Week 1	**Introduction to Statistics**
Exploring Data: Describing patterns and departure from patterns	Weeks 2 -3	**Constructing and interpreting graphical displays of distributions of univariate data (dot-plot, stemplot, histogram, cumulative frequency plot** • *Center and spread* • *Cluster and gaps* • *Outliers and other unusual features* • *Shape*
	Weeks 4-5	**Summarizing distributions of univariate data** • *Measuring spread: range, interquartile range, standard deviation* • *Measuring position: quartiles, percentiles, standards scores (z-scores)* • *Using box-plots* • *The effect of changing units on summary measures*
	Weeks 6-7	**Comparing distributions of univariate data (dotplots, back-to-back stemplots, parallel boxplots)** • *Comparing center and spread: within-group variation, between group variation* • *Comparing clusters and gaps* • *Comparing outliers and other unusual features* • *Comparing shapes*
	Weeks 8-10	**Exploring bivariate data** • *Analyzing patterns in scatterplots* • *Correlation and linearity* • *Least-squares regression line* • *Residual plots, outliers, and influential points* • *Transformations to achieve linearity: logarithmic and power transformations*

	Weeks 11-12	**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*
Sampling and Experimentation: planning and conducting a study	Week 13	**Overview of methods of data collection** • *Census* • *Simple survey* • *Experiment* • *Observational study*
	Weeks 14-16	**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*
	Weeks 17-18	**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 and confounding, including placebo effect and blinding* • *Complete randomized design* • *Randomized block design, including matches pairs design*
	Week 19	**Generalizability of results and types of conclusions that can be drawn from observational studies, experiments, and surveys**

2nd Semester

Topic	Week	Description
Anticipating Patterns: Exploring random phenomena using probability and simulation	Weeks 1-3	**Probability** • *Interpreting probability, including long-run relative frequency interpretation* • *'Law of Large Numbers' concept* • *Addition rule, 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, linear transformation of a random variable*
	Week 4	**Combining independent random variables** • *Notion of independence versus dependence* • *Mean and standard deviation for sums and differences of independent random variables*
	Weeks 5-6	**The normal distribution** • *Properties of the normal distribution* • *Using tables of the normal distribution* • *The normal distribution as a model for measurements*
	Weeks 7-10	**Sampling distribution** • *Sampling distribution of a sample proportion* • *Sampling distribution of a sample mean* • *Central Limit Theorem* • *Sampling distribution of a difference between two independent sample means* • *Simulation of sampling distributions* • *T-distribution* • *Chi-square distribution*
Statistical Interference:	Weeks 11-13	**Estimation (point estimators and confidence intervals)**

Estimating population parameters and testing hypothesis		• *Estimating population parameters and margins of error* • *Properties of point estimators, including unbiasedness and variability* • *Logic of confidence intervals, the meaning of confidence level and confidence intervals, and properties of confidence intervals* • *Large sample confidence interval for a proportion* • *Large sample confidence interval for a difference between two proportions* • *Confidence interval for a mean* • *Confidence interval for a difference between two mean (unpaired and paired)* • *Confidence interval for the slope of a least-squares regression line*
	Weeks 14-16	**Tests of significance** • *Logic of significance testing, null and alternative hypothesis: p-values; one- and two-sided tests; concepts of Type I and Type II errors; concept of power* • *Large sample test for a difference between proportions* • *Test for a mean* • *Test of a difference between two means (unpaired and paired)* • *Chi-square test for goodness of fit, homogeneity of proportions, and independence (one- and two-way tables)* • *Test the slope of a least-squares regression line*
Review and preparation for exams	Week 17	**AP Exams Review and Preparations** • *Preparing for the AP Statistics Exams* • *Techniques in taking AP Statistics Exams* • *Strategies for the Multiple-choice section* • *Free-response questions*
	Week 18	**Final Exam**