AP Statistics Course Audit
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Overview

Course Design

This AP Statistics course is taught as an activity-based course. Students actively construct their own understanding of statistics, with the educator guiding them in the use of correct usage, vocabulary, and interpretation. This course utilizes the most hands-on time possible in 50-minute blocks; however, in the interest of time and coverage, some topics are covered in a lecture-style format (notably surveys and sampling).

This section satisfies in whole or in part the following curricular requirement:

The course teaches students how to communicate methods, results, and interpretations using the vocabulary of statistics.

Course Requirements

Integrated Math 3 is a pre-requisite for the course. It is a combination course of algebraic, geometric and statistical concepts at the Algebra II level. Many students are co-enrolled in either precalculus or calculus.

Primary Textbook

Workshop Statistics: Discovery with Data and the TI Graphing Calculator (Rossman, Chance, and Von Oehsen) is the primary textbook for this class. We use *The Practice of Statistics* (Yates, Moore and Starnes) to supplement *Workshop Statistics* on some topics. Other textbooks (notably Bock, Velleman, DeVeaux's *Stats: Modelling the World* and Peck, Olsen, Devore's *Introduction to Statistics and Data Analysis*) are available in the classroom as further resources to students.

Technology

Students must have their own TI graphing calculator with a complete statistical package. Should students be unable to obtain their own, the instructor has a limited number to check out for the year. Although any TI calculator would work, the instructor is the most familiar with the TI-83/84 calculators.

The output of computer-generated data will be shared during class at appropriate intervals to work with the interpretation of said data.

This section satisfies in whole or in part the following curricular requirement:

The course teaches students how to use graphing calculators and demonstrates the use of computers and/or computer output to enhance the development of statistical understanding through exploring and analyzing data, assessing models, and performing simulations.

Projects

Each student will be responsible for several small projects throughout the year, some as personal projects and some as paired or group projects. Some projects will be a short paper, some will be a presentation; each depends on the context of the project. The year will culminate with each student proposing, conducting, analyzing and presenting the results on

the subject matter of their choice. This project starts after the AP exam and operates as a culmination of the year's work.

Each project is evaluated according to a common rubric that is reviewed beforehand. Since students are required to make presentations every year as part of a graduation requirement, I use a school-wide common rubric for presentations. In general, each project is evaluated on behalf of its statistical process, communication, and interpretation.

This section satisfies in whole or in part the following curricular requirements:

The course draws connections between all aspects of the statistical process, including design, analysis, and conclusions.

The course teaches students how to communicate methods, results, and interpretations using the vocabulary of statistics.

Assessment

Since passing the AP Statistics exam is the end goal of this course, tests and quizzes are based on the AP exam model. Half of the exam's credit is multiple choice, and half is free response. The free response questions, when possible, are based on released free response questions. The multiple choice questions are, as often as possible, released questions from the AP exam.

Course Outline

This section satisfies the following curricular requirement:

The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on each:

- Exploring data
- Sampling and experimentation
- Anticipating patterns
- Statistical inference

This outline is organized by the following four topics:

Topic Outline	**Timing**	**Topics and Activities**	**Resources and assignments**
• Taken from the College Board *Statistics: Course Description* • Includes Topic Outline points as they are covered	• Outlined in days • Includes timing for review, quizzes and tests • Timing for projects is totaled for each unit	• In-class activities by Topic from *Workshop Statistics* (abbreviated WSS) • Reading assignments (usually from *The Practice of Statistics*, abbreviated YMS) • Lecture • Discussion	• Problem set assignments from *Workshop Statistics* (abbreviated WSS) • Problem assignments from *The Practice of Statistics* (abbreviated YMS) • Presentations covered in lecture • Worksheets as assigned • Project description documents (included in appendix)

Unit 1: Univariate Data

From *AP Central's Statistics: Course Description,* page 11*: Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis should be placed on interpreting information from graphical and numerical displays and summaries.*

17 days

Topic Outline IA: Constructing and interpreting graphical displays of distributions of univariate data (dotplot, stemplot, histogram, cumulative frequency graph)	2 days	**Data Variables and Distribution** • WSS Topic 1 in-class activities	WSS: Topic 1, 1-8, 1-10, 1-16
	2 days	**Data Variables and Technology** • WSS Topic 2 in-class activities	WSS: Topic 2, 2-5, 2-7, 2-9
	2 days	**Displaying and Describing Distributions** • WSS Topic 3 in-class activities • YMS p. 28-30	WSS Topic 3: 3-6, 3-11, 3-17 YMS 1.19
	1 day	QUIZ	
Topic Outline IB: Summarizing distributions of univariate data 1. Measuring center 2. Measuring spread 3. Measuring position 4. Using boxplots 5. Changing units on summary measures	2 days	**Measures of Center** Topics covered: Mean, median, dotplots, resistance • WSS Topic 4 in-class activities	WSS Topic 4: 4-5, 4-11, 4-13
	4 days	**Measures of Spread** Topics covered: 5-number summary, boxplots, empirical rule and z-scores • WSS Topic 5 in-class activities	WSS Topic 5: 5-8, 5-9, 5-11, 5-19, 5-21
	3 days	**Review and Project**	WKST: Describing Data Project: Graphical Displays

	1 day	TEST	

Unit 2: Bivariate Data

26 days

Topic Outline IC: Comparing Distributions of Univariate Data 1. Comparing center and spread 2. Comparing clusters and gaps 3. Comparing outliers and other features 4. Comparing shapes **Topic Outline IE: Exploring Categorical Data** 1. Frequency tables and bar charts 2. Marginal and joint frequencies for two-way tables 3. Conditional relative frequencies 4. Comparing distributions using bar charts	6 days	**Comparing Distributions** Topics include: side-by-side stemplots and boxplots, modified boxplots, statistical tendency, two-way tables, categorical relationships, independence • WSS Topic 6 in-class activities (quantitative) • WSS Topic 7 in-class activities (categorical)	WSS Topic 6: 6-6, 6-11, 6-13, 6-15 WSS Topic 7: 7-6, 7-12, 7-19, 7-20
	1 day	QUIZ	
Topic Outline ID: Exploring Bivariate Data 1. Analyzing patterns in scatterplots 2. Correlation and linearity	3 days	**Graphical Displays of Association** Topics include: scatterplots, statistical association • WSS Topic 8 in-class activities	WSS Topic 8: 8-6, 8-11, 8-17, 8-20
	3 days	**Correlation Coefficient** Topics include: *r*, properties of correlation coefficient • WSS Topic 9 in-class activities	WSS Topic 9: 9-6, 9-7, 9-9, 9-15
	1 day	QUIZ	

Topic Outline ID: Exploring Bivariate Data 3. Least Squares Regression line 4. Residual plots, outliers, and influential points 5. Transformations to achieve linearity: log and power transformations	8 days	**Least-squares Regression** Topics include: Least-squares regression line from a description viewpoint, outliers and influential points, non-linearity, data transformations • WSS Topic 10 in-class activities • WSS Topic 11 in-class activities • Lecture: Logarithmic and power transformations for linearity • Log transformations: YMS p. 203-211 • Power transformations: YMS p. 214-219	WSS Topic 10: 10-5, 10-9, 10-15, 10-17 WSS Topic 11: 11-4, 11-10, 11-11 Bivariate data.ppt YMS 4.6, 4.8, 4.11 YMS 4.50, 4.51, 4.52, 4.53, 4.54
	3 days	Review and Project	Project: Regression Analysis
	1 day	TEST	

Unit 3: Collecting Data

From *AP Central's Statistics: Course Description,* page 12*: Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. This plan includes clarifying the question and deciding upon a method of data collection and analysis.*

14 days

Topic Outline IIA: Overview of methods collection 1. Census 2. Sample Survey 3. Experiment 4. Observational Study **Topic Outline IIB: Planning and conducting surveys** 1. Characteristics of a well-designed and well-conducted survey 2. Populations, samples, and random selection 3. Sources of bias in sampling and surveys 4. Sampling methods including SRS, stratified, and cluster. **Topic Outline IID. Generalizability of results** and types of conclusions that can be drawn from observational studies, experiments, and surveys	6 days	**Surveys and Sampling** Topics include: data sources, types of sampling, random sampling, properties of randomness, bias • Lecture: Randomness • Lecture: Surveys and sampling • WSS: Topic 12 In-class Activities *Population & Sampling *Using the Random Number Table	Randomness.ppt Surveys and sampling.ppt WSS: Topic 12, 12-7, 12-8, 12-11, 12-25

Topic Outline IIC. Planning and conducting experiments 1. Characteristics of a well-designed and well-conducted experiment 2. Treatments, control groups, experimental units, random assignments, and replication 3. Sources of bias and confounding, including placebo effect and blinding 4. Completely randomized design 5. Randomized block design, including matched pairs design **Topic Outline IID. Generalizability of results** and types of conclusions that can be drawn from observational studies, experiments, and surveys	4 days	**Designing Experiments** • Lecture: Experimentation • Discussion: Results of Experimentation	WKST: Experimentation and Results
	3 days	Review and Project	Project: Survey Bias
	1 day	TEST	

Unit 4: Randomness in Data

From *AP Central's Statistics: Course Description,* page 12: *Probability is the tool used for anticipating what the distribution of data should look like under a given model.*
29 days

Topic Outline IIIA. Probability 1. Interpreting probability, including long-run relative frequency interpretation 2. "Law of Large Numbers" concept 3. Addition rule, multiplication rule, conditional probability, and independence	5 days	**Probability** Topics include: rules of probability, dependent and independent events, Law of Large Numbers, simulation • WSS: Topic 14 In-class activities • Lecture: Probability	WSS: Topic 14: 14-7, 14-10, 14-13, 14-14, 14-15 Probabilities.ppt WKST: Probabilities
Topic Outline IIIC. The normal distribution 1. Properties of the normal distribution 2. Using tables of the normal distribution 3. The normal distribution as a model for measurements	7 days	**Normal Distributions** Topics include: normal distribution curve, table of normal probabilities, standardization, empirical rule, z-scores. • WSS: Topic 15 in-class activities • Lecture: Normal Distributions	WSS: Topic 15: 15-4, 15-6, 15-9, 15-13 Additional homework: 15-5. 15-8. 15-11 Normal Distributions.ppt WKST: Normal Distributions
	1 day	Review	
	1 day	QUIZ	

Topic Outline IIIA: Probability 4. Discrete random variables and their probability distributions, including binomial and geometric 5. Simulation of random behavior and probability distributions 6. Mean (expected value) and standard deviation of a random variable, and linear transformation of a random variable **Topic Outline III D. Sampling distributions** 1. Sampling distribution of a sample proportion 2. Sampling distribution of a sample mean 3. Central Limit Theorem 6. Simulation of Sampling distributions	7 days	**Sampling Distributions** Topics include: Sampling variability, sampling distribution, sample proportions, confidence, significance, sample means <u>Binomial Distributions</u> • YMS 438-459 <u>Geometric Distributions</u> • YMS 464-475 <u>Proportions</u> • WSS: Topic 16 in-class activities • Lecture: Sampling Distributions <u>Means</u> • WSS: Topic 17 in-class activities	YMS 8.27, 8.28, 8.30, 8.34, 8.35 YMS: 8.41, 8.45, 8.47, 8.51 WSS: Topic 16: 16-5, 16-9, 16-10, 16-13 Sampling Distributions.ppt WSS: Topic 17: 17-6, 17-8, 17-10
Topic Outline IIID: Sampling Distributions 3. Central Limit Theorem	4 days	**Central Limit Theorem** • WSS Topic 18 in-class activities • Lecture: CLT	WSS: Topic 18: 18-7, 18-9, 18-11, 18-15 CLT.ppt
	3 days	Review and Project	Project: Probabilities
	1 day	TEST	

Unit 5: Inferences From Data: Principles

From *AP Central's Statistics: Course Description,* page 13: *Statistical inference guides the selection of appropriate models.*

27 days

Topic IIID: Sampling Distributions 7. t-distribution **Topic IV A: Estimation (point estimators and confidence intervals)** 1. Estimating population parameters and margins of error 2. Properties of point estimators 3. Logic of confidence intervals 4. Large sample confidence interval for a proportion 5. Large sample confidence interval for a difference between two proportions 6. Confidence interval for a mean 7. Confidence interval for a difference between two means	9 days	**Confidence Intervals** Topics include: confidence intervals for a proportion, simulations of binary distributions, standard error, margin of error, technical conditions of confidence intervals, confidence intervals for a mean, t-distribution vs. normal distribution <u>Proportions</u> • WSS Topic 19 in-class activities <u>Means</u> • WSS Topic 20 in-class activities • Lecture: Confidence Intervals	WSS: Topic 19: 19-7, 19-10, 19-11, 19-17 WSS: Topic 20: 20-6, 20-7, 20-9, 20-12 Confidence Intervals.ppt
	1 day	Review	
	1 day	Quiz	

Topic Outline IV B. Tests of significance 1. Logic of significance testing, null and alternative hypotheses; p-values; one- and two-sided tests; concepts of Type I and Type II errors; concept of power 2. Large sample test for a proportion 4. Test for a mean	5 days	**Tests of Significance** Topics include: reasoning and structure of tests of significance, CLT (review), null hypothesis, sample size and significance testing, significance testing with population proportions, significance testing with population means <u>Power</u> • YMS 599-602 • YMS 639-640 <u>Proportion</u> • WSS Topic 21 in-class activities <u>Mean</u> • WSS Topic 22 in-class activities <u>Type I and Type II</u> • YMS 594-598 • Lecture: Tests of Significance	YMS 10.70-10.73 YMS 11.21-11.23 WSS: Topic 21: 21-5, 21-6, 21-10, 21-11, 21-16 WSS: Topic 22: 22-5, 22-6, 22-7, 22-8, 22-10 YMS 10.66-10.68 Tests of Significance.ppt
Topic Outline IV B. Tests of significance 1. Logic of significance testing, null and alternative hypotheses; p-values; one- and two-sided tests; concepts of Type I and Type II errors; concept of power	7 days	**More Inference Considerations** Topics include: Tests vs. intervals, failing to reject the null hypothesis vs "accept the null hypothesis" as correct language • WSS Topic 23 in-class activities • Discussion: Inference • Lecture: Statistical Inference	WSS: Topic 23: 23-8, 23-9, 23-11, 23-13, 23-17, 23-23 Statistical Inference.ppt
	3 days	Review	
	1 day	TEST	

Unit 6: Inference from Data: Comparisons and Relationships 21 days			
Topic Outline IIID: Sampling Distributions 4. Sampling distribution of a difference between two independent sample proportions 5. Sampling distribution of a difference between two independent sample means **Topic Outline IV B. Tests of significance** 3. Large sample test for a difference between two proportions 5. Test for a difference between two means (unpaired and paired)	9 days	**Comparisons** Topics include: comparing two population proportions between two groups, p-values, effects of sample size, two-sample t-tests, t-intervals, <u>Proportions</u> • WSS Topic 24 in-class activities (proportions) • WSS Topic 25 in-class activities (means) • Lecture: Comparisons	WSS Topic 24: 24-5, 24-6, 24-7, 24-8, 24-10 WSS Topic 25: 25-4, 25-5, 25-8, 25-22 Comparisons.ppt
Topic IIID: Sampling Distributions 8. chi-square distribution **Topic IV B: Tests of Significance** 6. Chi-square test for goodness of fit, homogeneity of proportions, and independence (one- and two-way tables)	4 days	**Inference for Two-way Tables** Topics include: chi-square test for independence, two-way tables (review), expected counts, two-proportion *z*-test, p-values, • WSS Topic 26 in-class activities • Lecture: Inference with Tables	WSS Topic 26: 26-6, 26-7, 26-9, 26-10 Inference with Tables.ppt

Topic IV B: Tests of Significance 7. Test for the slope of a least-squares regression line	4 days	**Inference for Correlation and Regression** Topics include: inference for correlation and regression, confidence intervals, regression slope • WSS Topic 27 in-class activities	WSS Topic 27: 27-5, 27-9, 27-13
	3 days	Review (no project)	
	1 day	TEST	
AP Exam Preparation and Review 15 days			
	15 days	Review for AP Exam • Free response: execution and grading • Multiple choice: interpretation and strategy • Sample Exam (2002 released MC)	
After the AP Exam			
	25 days	Final Project	Project: Final Project

Appendix

The following pages constitute bibliography, projects, presentations and/or worksheets that were referenced in the course outline.

All dates referenced as due dates or activity dates are based on the 2006-2007 school year and will adjust with each school year's calendar.

Bibliography

Rossman, Allan J., Beth L. Chance, and J. Barr Von Oehsen. *Workshop Statistics: Discovery with Data and the Graphing Calculator*. 2nd ed. Emeryville, CA: Key College Publishing, 2002.

Yates, Daniel S., David S. Moore and Daren S. Starnes. *The Practice of Statistics*. 2nd ed. New York, NY: W. H. Freeman and Company, 2003.

Univariate Data Display Project

Outcome: Individual Poster

Due Dates:
Proposal: due September 15th
Poster: due September 25th

Note: The posters are due at the beginning of the period on September 25th, even if you are absent.[1]

Topic: You will design a graphical display of information based on the data of your choice. You can either generate this data yourself or find existing data to use.[2] You must provide correct analysis of all appropriate measures.

Proposal:
1—A description of the data set you propose to display
2—Source for your dataset (either collected yourself [and if so, how], or the outside source for your data
3—A brief overview on how you expect to display your data (form of display)
Your proposal must be typed.

Poster:
The poster should completely summarize your data, yet be simple enough to be understood by a freshman. Keep your conclusions in context! It should be pleasing to the eye, and readable from several feet away. The colors on your graph will be crucial—include a color-key. Your poster should indicate how you collected your data *or* reference its source.

Remember, there will be no presentation, so for full credit, your poster should need no introduction to be understood clearly.

[1] Late posters will be docked 5% per day (or partial day) until the maximum score before grading is a 75%.
[2] If you use existing data, you must provide *correctly formatted references* on your poster.

Regression Analysis Paper Project

Outcome: a 2-page typed paper

Due Dates:
Proposal: October 16th
Paper: October 30th
Note: The paper is due **at the beginning of the period** on October 30th, even if you are absent.[1]

Topic: Go to the library, and, using any of the statistical abstracts available, run a series of regression analyses on some related bivariate data. Start with a hypothesis such as "there is an negative relationship between employment and personal bankruptcies". Find data that you could use to test this hypothesis. In this case, it would be employment (or unemployment) figures, and personal bankruptcy data.[2] Use at least 10 data points. An easy way to do this would be to use 10 years worth of data for each variable. Any fewer than 10 data points will not be enough! Time is not to be used as an explanatory variable!!

Proposal:
1—The type of data you are investigating, indicating which is the explanatory and which is the response variable
2—Source(s) for your dataset
3—Your hypothesis

Paper: Your paper need not be longer than two typed, double-spaced pages, but it should include the following details:

1. The type of data you are investigating; identify the explanatory and response variable, and why you chose this particular set of data (personal interest?)
2. The actual data set along with its source. (the book or article it came from)[3]
3. A rough plot of the graph.
4. An interpretation of the graph's direction, form, and strength.
5. A regression equation with its corresponding r and R^2 values.
6. A rough graph of the residual plot.
7. The least square regression equation on the transformed data.
8. The model equation.
9. A statement describing what you have discovered, including a reasonable explanation as to why you think what you discovered occurred.

For full credit, spell-check, proofread, and edit your paper. Remember, this class is for college credit—write accordingly!

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[1] Late papers will be docked 5% per day (or partial day) until the maximum allowable score is 75%.
[2] The statistical abstracts in the library or on line would have this information. They are loaded with bizarre and absurd facts. We will spend class time on October 6th to identify some of these abstracts. There may be further classroom time available for library research.
[3] Remember, references must be correctly formatted.

Survey Bias Presentation and Poster Project

Outcome: Poster and 5 minute group presentation

Due dates:
Proposal: Friday, December 15th
Presentation: Wednesday, January 3rd
Note: All posters are due at the beginning of the period, Wednesday, even if you are absent.[1]

Topic: You (in a pair or in a group up to 3—not by yourself) will design a survey on an interesting topic of your choice, but you must design it so you can address ONE of the following questions:

1. Is it possible to word a question in two different ways that are logically equivalent, but have much different responses?
2. Do the characteristics of the interviewer affect responses?
3. Does anonymity change the responses to sensitive questions?
4. Does providing extra information affect the responses?

Note: You may choose another form of bias if you get special approval from your teacher

Proposal:
1—A definition of the population
2—A copy of your survey questions
3—A short description of how you will create bias and what direction you think the bias will swing
4—Where and how you will collect your data
Proposals must be typed.

Note: Your sampling procedure should **not** be biased. Survey 40 people per question (40 biased, 40 unbiased).

Poster: The poster should completely summarize your project, yet be simple enough to be understood by a freshman. Remember the purpose of the project! It should be pleasing to the eye. It should include a one-page typed paper describing what you did. The colors on your graphs are crucial to communicating your bias: use a consistent color-key so that the change can be easily spotted.

Oral Presentation: All group members need to participate equally. Your poster should be used as a visual aid. FIVE MINUTES MAXIMUM. To receive full credit for your presentation your group must speak clearly, with confidence and must do something to ENGAGE THE AUDIENCE. I leave it open-ended as to exactly what you tell us about what you did, but your presentation must be clear, interesting and well-spoken if you want full credit.

[1] Late posters will be docked 5% per day (or partial day) until the maximum allowable score is 75%

Probabilities Paper Project

Outcome: a 2-page (minimum) typed paper

Due Dates:
Paper: January 22nd
Note: The paper is due **at the beginning of the period** on January 22nd, even if you are absent.[1]

Topic: Compare theoretical, simulated and observed data for the same event.

For your theoretical data, assume that births of girls and boys are equally likely to occur. Find the theoretical probability of families having 0, 1, 2, 3, and 4 girls, respectively. Show how you got your values. Summarize the results graphically and numerically (shape, center and spread).

For your simulated data, design a simulation for families with four children to determine how many of those children are girls. Perform your simulation 32 times. You may use any method you desire (number table, flipping a coin, rolling a die, etc) but describe the method you used *completely*. Summarize your results in a table, graphically and numerically (shape, center and spread). Compare your simulated data with your theoretical results, using graphical comparisons (back-to-back stemplots) and numerical ones.

For your observed data, collect data from 16 real families that have four children and find the number of girls in each of the 16 families. List your data values and summarize them in a frequency table and in a graph. Compare your observed data to the theoretical data, using graphical comparisons (back-to-back stemplots) and numerical ones.

Paper: Your write-up should include a title page and the following paragraphs:
1—Introduction
2—Theoretical data
3—Description of simulation you and your partner chose
4—Simulated data
5—Comparison of theoretical and simulated data
6—Observed data
7—Comparison of theoretical and observed data
8—Conclusion

For full credit, spell-check, proofread, and edit your paper. Remember, this class is for college credit—write accordingly! All graphs and tables should be typed or neatly written in ink. They should be included within the body of your paper at the appropriate point. If separate, refer to them in the paper by page and "figure" number.

[1] Late papers will be docked 5% per day (or partial day) until the maximum allowable score is 75%.

Final Project: Paper and Presentation

Outcome: Paper and 5 minute presentation.

Due dates:

Proposal: Monday, May 14th
Data Report: Monday, May 21st
Data Exploration: Friday, May 25th
Data Analysis: Tuesday, May 29th
Presentations: June 4th, 5th, 6th and 7th.

Note: Presentation days will be randomly assigned! All due dates are at the *beginning* of the period on that date.[1] All assignments (except, of course, the presentation) may be turned in early.

Topic: You are to select a question you'd like to answer. Plan an experiment or test—no opinion surveys. Make it a topic you are interested in that is appropriate for the classroom. See your teacher for suggestions if you can't think of anything.

Proposal:

1—What is the question you want to answer?
2—Who/what is your target population about which you will be gathering data?
3—What is your planned sample size(s)?
4—How will you design your study? How will you randomize (if appropriate)?
5—How will you analyze your data?
6—Who in your group has been assigned what?

Data Report: This should be a thorough explanation of how you collected your data and be a demonstration of what you've learned this year about getting a representative sample. You should include:

- how you collected your data,
- why you're confident that your sample matches your population,
- biases you've avoided *and* biases you've not avoided,
- a copy of any survey you've filled out.
- Most importantly, you must include your data itself, either in an Excel format or in a two-way table summary.

Data Exploration: This should be a demonstration of our first unit, Describing Data. Graphs should show the comparisons between all relevant groups you are comparing. You should

- state any preliminary conclusions that can be drawn by visual comparison.
- include graphs of your data,
- include statistics from your data,
- describe the graphs and statistics using correct vocabulary and used *in context.*

[1] Grades at each stage will be docked 5% for each day (or partial day) that they are late, until they reach a maximum allowable score (before grading) of 75%.

Data Analysis: Analyze your data using whatever method(s) is appropriate for your data. This will essentially be your paper. You need to include a title page, an introduction, and all other parts of a well-written paper. Your conclusion should be nicely written using all appropriate statistical support. Remember that confidence intervals can be a powerful method for comparing different groups. Include

- Hypothesis test (with conditions checked) and/or
- Confidence Intervals (with conditions checked) and/or
- Regression
- Your grand conclusions!

Presentation: This is your chance to *hook* us into what you've devoted an entire month to! Make it interesting. Be careful with how you communicate—make your numbers relevant. Visual aids should *not* be your entire presentation, but they should be supplements to your presentation. You may do your presentation in any medium you wish (video, PowerPoint, poster, etc) as long as you clear it with your teacher first. Clearly communicate

- your question,
- how you collected your data,
- your conclusions.

And finally, be prepared for questions. If you've done your job, we'll be interested and have questions.

Things you should know:

- This project counts as a test grade. The point breakdown is as follows:
    - Proposal: 20 points
    - Data Report: 40 points
    - Data Exploration: 40 points
    - Data Analysis: 50 points
    - Presentation: 50 points
- There will be **no** late presentations scheduled. If you cannot present, you will receive a 0 for those points, and get a maximum of 75% on the final project.
- Late work will be docked 5% per day (or partial day) that it is late, until the maximum allowable points is at 75% of the original total. Any loss of points for incompleteness, etc, are *on top of* loss of points for lateness. Even if you're absent or ill. So get it in (email is acceptable).
- Make your own copies of the proposal, reports, explorations and analysis. I need to keep everything I receive.
- Don't get lazy! This is the summation of everything we've done all year. Do work you can be proud of (especially useful for job/internship/scholarship/ college/important interviews).
- Type all papers that you submit.