Name:_____
(An electronic version of this document can be found on the khsapstats.weebly.com)

AP Statistics Final Exam Research Project
1st Draft of steps 1-3 (Q #1-5) Due: **May 28th**
Completed Project Due: **June 3rd** (for seniors) and June **12th** (for juniors)

You will use everything you have learned this year to go through a Statistical Investigation:

Pose a question and design a study to answer it

Collect data from the study

Analyze the results of the study

Interpret results in the context of the study

Step 1: Select a Research Topic
Select a problem that can be aided by good research or a genuine need that can be researched. You will need to collect your own data but you can compare your data with data from Census at Schools, TuvaLabs or another source. You can also design an experiment with multiple treatments. If possible this research topic should be related to your future career or your major in college.

Your topic should compare several variables and not be a simple question.

For example:

Good Examples	Simple Examples (not sufficient)
School Spirit (what contributes to…)	What proportion of students have school spirit.
What you choose to eat during lunch and your grades after lunch.	What students chose to eat during lunch or average GPA after lunch (not comparing these).
Does the color distribution or weight/amount of a favorite food match what the company says it should be?	What is the color distribution or weight/amount of a favorite food?
Regression analysis between GPA and SAT/ACT scores among KHS 2019 senior class and how this compares with national averages.	GPA distribution or SAT/ACT scores among KHS 2019 senior class.
Proportion of KHS college bound seniors who plan on studying (art, science, etc.) compared to the national average.	Proportion of KHS college bound seniors who plan on studying (art, science, etc.)
Some kind of a paired t-test, 2 sample t test, two proportion z test, chi-squared test.	Some kind of a 1 sample t test, 1 proportion z test or GOF test.

Warnings:
- You will need to satisfy the conditions for inference. If you are studying a proportion, your sample must be large enough to have the expected number of successes and expected number of failures in each group to be at least 10.
- It is hard to get a meaningful Chi-Squared test with a small data set. You will need to satisfy the expected cell frequency condition. So you either need to have only 2-3 categories for each variable.

1. What is your topic?

2. Why is this topic important and relevant today?

3. How will your research help in solving this problem?

Step 2: Post a Statistical Question

4. What is the question you hope to answer as a result of your research? (Be sure to specify the population of interest and the variable(s) you are studying.)

Step 3: Design an experiment or observational study to answer your question

Design your study below keeping in mind the following:

- What are possible biases that will result from this study?
- How are you going to design your experiment to reduce these biases?
- If you are doing a hypothesis test, what are your null and alternative hypotheses? What alpha level will you choose? Which conditions apply to this test?

5. Describe the design of your study: (If you are using data from another source, what source is it and how are you using that in the overall design of your study?)

(Should be completed in your presentation or completed electronically.)

Step 4: Conduct the experiment/observational study
If you need to deviate from your earlier design, be prepared to justify why.
You must include your original data.
6. Were there any problems or difficulties that arose as you began conducting your data?

Step 5: Analysis
7. Please do a thorough analysis on your data:
   - If you are performing a hypothesis test, be sure to:
     - State the hypothesis
     - Check the conditions
     - Name the test
     - Perform the test
   - If your study includes a regression analysis
     - What is the regression line?
     - What is the range in the explanatory variable that we can use this regression line?
     - What was the correlation coefficient?
   - Include graphs where possible
   - Draw a conclusion in context
     - Be careful not to imply causation unless you performed an experiment.
     - Comment on any biases that may exist in your data.
     - Comment on any limitations (for example the scope of your study).

Step 6: Presentation
10. On or before the day of your final exam (May 31), you will stand in front of the class and present your research topic, your research question, the design of your study and the results. This should be a professional presentation, but you do not need to dress up.
   - You may want to prepare a PowerPoint or Google Slides file
   - Be prepare to answer questions about your research
   - Instead of standing in front of the class and presenting, you can create a video and share it with Mr. Lewis (ben.lewis@student.dodea.edu)

Rubric

Step	Weight	0 Not Done	2 Serious Flaws	3 Minor Flaws But Satisfactory	4 Competent	5 Excellent	Score
Research Topic	10	Not Done	The topic is not useful and simple.	The topic is relevant and simple.	The topic addresses in interesting issue and is complex.	The topic addresses an important issue and is complex.	
Design of the study	20	Not Done	The design consists of a convenience sample. There would be large biases.	The design includes randomization but there are minor flaws in the design.	The design is would work, but isn't the best design that could be used.	The design is thought out and well-articulated.	
Conduct the study	20	Not Done	The study was conducted while the design had major flaws. This includes a convenience sample.	The study was conducted while the design had minor biases.	The study was carried out well, but it had a few fixable mistakes.	The study is carried in the most effective way possible.	
Analysis	30	Not Done	The analysis had major flaws.	The analysis was carried out with more than two minor flaws.	The analysis was carried out with only one or two minor flaw.	The analysis was carried out without any flaws.	
Presentation	20	Not Done	The presenter seemed unprepared. There were major flaws in the presentation of the research project.	Only two of the three: (the topic, design and analysis) were presented and the presentation lacked some clarity or professional quality. Or all three elements were presented but there was a significant lack of clarity and/or professionalism.	Only two of the three: (the topic, design and analysis) were presented or the presentation lacked some clarity or professional quality.	The topic, design and analysis were clearly and professionally presented.	
Total	**100**						