AP Statistics Exam Review Checklist

Organizing Data

CHAPTER ONE

- I can describe the distribution of a variable in context of the problem and support this with numerical evidence
- I can compare two distributions
- I can construct and interpret box plots, dot plots, histograms, time plots, ogives and stem and leaf plots by hand and with my calculator
- I can identify and draw conclusions with mean, median, percentile, quartiles, range, std. deviation, variance, inter-quartile range and outliers
- I can describe how linear transformations affect a set of data
- I can state the variables of a situation and distinguish between categorical and quantitative variables

CHAPTER TWO

- I can define and state the properties of a density curve
- Given a density curve, I can find the probability of an event, define how shape affects measures of center, spread and find quartiles and percentiles
- I can define and state the properties of a normal distribution
- I can find a z-score, describe what it indicates, calculate percentile and use it to make comparisons
- I can explain the meaning of the 68-95-99.7 rule and use it to estimate the probability of different events
- I can use my graphing calculator to calculate probabilities and percentiles (normalcdf)
- Given a probability I can use my calculator to calculate the interval in the context of the problem (invNorm)
- I can assess if a distribution is normal using a Normal Probability Plot

CHAPTER THREE

- I can create a scatterplot (by hand or with my calculator) and describe the association of the variables in context of the problem
- I can find the LSRL (Least Squares Regression Line) equation given a data set or given statistics on the data set.
- I can assess if a line is the appropriate form for fitting an equation to the data set using the correlation coefficient, the shape of the graph as well as the residual plot
- I can understand and interpret the properties of r
- I can interpret the slope and y-intercept or a LSRL in the context of the problem
- I can understand the technical meaning of r^2
- I can calculate the residual for a given observation
- I can define which is the explanatory and which is the response variable in a given situation (if it matters)
- I can use the LSRL to make a prediction
- I can recognize outliers and influential observations and describe their affects on the LSRL and the value of r

CHAPTER FOUR

- I can recognize lurking variables in a situation and the effects it has on association, such as common response or confounding
- I can explain why correlation based on averages is stronger than correlation on individuals
- I can explain why high correlation does not imply causation
- I can read a two-way table and compute the marginal and conditional distributions
- I can display a two-way table in bar graph form and make an inference about the data displayed
- I can recognize extrapolation and be aware of its dangers
- I understand and can explain Simpson's Paradox
- I can recognize outliers and influential observations and describe their affects on the LSRL and the value of r

OTHER

- I have practiced example A.P. style free response questions which relate to organizing data and I feel able to answer these types of questions well.
- I have practiced example A.P. style multiple choice questions which relate to organizing data and I feel able to answer these types of questions well.

Experimental Design

CHAPTER FIVE

- I can identify the population and the sample in a sampling situation and can define a census
- I understand and can recognize bias due to wording, voluntary response, under-coverage, response, non-response or other inferior sampling methods
- I can use a table of random digits and my calculator to select a simple random sample (SRS), select a stratified random sample (for blocking) or for simulations
- I can recognize whether a study is an observation or an experiment
- I can identify the factors, treatments, response variables, and experimental units or subjects in an experiment
- I can explain why a randomized comparative experiment can give good evidence for causation
- I can outline the design of a completely randomized experiment using a diagram (state sizes, treatments, response variables and randomization location)
- I can define and understand when and why to double-blind an experiment
- I can decide which type of experimental design to use (Completely Randomized, Block, Matched Pairs, Crossover) and why.
- I can use the following steps to construct and run a simulation: Scheme (State Assumptions & Assign Digits), Stopping Rule, Count, Repeat, Conclusion)

OTHER

- I have practiced example A.P. style free response questions which relate to experimental design and I feel able to answer these types of questions well.
- I have practiced example A.P. style multiple choice questions which relate to experimental design and I feel able to answer these types of questions well.

Probability

CHAPTER SIX

- I can define random phenomenon and probability [$0 \le P(A) \le 1$]
- I can determine whether events are independent and describe what that means [$P(A \cap B)=P(A)P(B)$]
- I can create a sample space, list all outcomes and all events and the probability of the events
- I can create a probability model for a random phenomenon and know $P(S)=1$
- I can use a tree diagram and/or multiplication rule to find possible outcomes and probabilities
- I can define and give examples of complementary [$P(A^c)=1-P(A)$], mutually exclusive and disjoint events [$P(A \cup B)=P(A)+P(B)$] and know what this implies about probability
- I can use the following probability rules in the correct situation: *$P(A \cup B)=P(A)+P(B)-P(A \cap B)$ *If A and B are disjoint, $P(A \cap B)=0$ *$P(A|B)=P(A \cap B)/P(B)$
- **I understand that although probability rules are helpful I can solve many problems with tree diagrams, multiplication rule, Venn diagrams and some common sense**

CHAPTER SEVEN

- I can define a discrete random variable and create the appropriate probability distribution
- I can define a continuous random variable and create the appropriate probability distribution
- I can find the expected value and the variance of a discrete random variable and understand what they tell me (onevar-stats L1, L2)
- I can use a discrete probability distribution to find the probability of a range and the probability of an individual outcome
- I can use a continuous probability distribution to find the probability of a range and know the probability of an individual outcome (area under the curve)
- I can calculate the new mean and variance* for a linear transformation of a random variable (*note: variance must be converted to standard deviation to put into the linear transformation)
- I can calculate the new mean and variance* for the combination of two random variables (*note: variances can be added together, standard deviations can not)
- I can determine whether a game is fair (expected value is equal to the cost)
- I understand the Law of Large Numbers and how it relates to mean and variance

CHAPTER EIGHT

- I can describe the factorial function
- I can choose whether a setting is binomial or geometric
- I can find the mean and standard deviation of a binomial distribution
- I can find the mean of a geometric distribution
- I can use my calculator to calculate the probability of binomial situations (pdf & cdf)
- I can use my calculator to calculate the probability of geometric situations (pdf & cdf)
- I can decide when it is appropriate to use the normal distribution to find binomial probability
- I can simulate a binomial or geometric situation
- I can calculate geometric probabilities without the use of the geomcdf and geompdf functions
- I can determine if a binomial setting can be considered normal [np>10 and n(1-p)>10]

CHAPTER NINE

- I can decide whether a value is a parameter or a statistic and use appropriate notation
- I can define a sampling distribution
- I can decide whether a statistic is unbiased and find the mean of the sampling distribution
- I can determine if a sampling distribution for proportions is approximately normal [np>10 and n(1-p)>10]
- I can determine if it is appropriate to use the standard deviation formulas for a sample proportions [Pop>10n]
- I can calculate the standard deviation of a sampling distribution for proportions $\sqrt{\frac{p(1-p)}{n}}$
- I can use the Central Limit Theorem to decide if a sampling distribution for means is approximately normal [n>30]
- I can calculate the standard deviation of a sampling distribution for means $\frac{s_x}{\sqrt{n}}$

OTHER

- I have practiced example A.P. style free response questions which relate to probability and I feel able to answer these types of questions well.
- I have practiced example A.P. style multiple choice questions which relate to probability and I feel able to answer these types of questions well.

Inference Procedures

CHAPTER TEN

- I can estimate a mean using a confidence interval at confidence level C (using the inference toolbox) and state it in the context of the problem [Stat $\pm$ Crit.Val*St.Dev.Stat]
- I can define/calculate a critical value
- I can determine how the confidence level, sample size and width of a confidence interval are related
- I can interpret the meaning of a confidence interval in context of a problem and interpret the confidence level
- I can define/calculate the margin of error for an estimate of the mean
- I can determine a sample size necessary for a given margin of error
- I can choose the appropriate hypothesis test about means using the z-test {z-test, 2 sample z-test, matched pairs z-test} (following the inference toolbox)
- I can verify conditions to run the z-procedures on means (SRS, Dist normal by CLT)
- I can verify conditions to run the z-procedures on proportions (SRS, Dist normal by np>10 and n(1-p)>10, also St. Dev Formula can be used by Population>10n)
- I can define/calculate a p-value
- I can draw a conclusion for a hypothesis test based on the significance level and the p-value and state it in context of the problem
- I can draw a conclusion for a hypothesis test based on a confidence interval and state it in the context of the problem
- I can write a null and alternative hypothesis and state them in the context of the problem
- I can determine if a test is one or two-tailed and know how this effects the p-value
- I can define/calculate Type I error and state what it means in context of the problem
- I can define Type II error and state what it means in context of the problem
- I can define the power of a significance test and know it's relationship to Type II error

CHAPTER ELEVEN

- I can estimate a mean using a confidence interval at confidence level C (using the inference toolbox) and state it in the context of the problem [$CI: \bar{x} \pm (t^*)\left(\frac{s_x}{\sqrt{n}}\right)$]
- I can define/calculate a critical value for t-procedures
- I can interpret the meaning of a confidence interval in context of a problem and interpret the confidence level
- I can calculate standard error for the t-procedures [$SE = \left(\frac{s_x}{\sqrt{n}}\right)$]
- I can define/calculate the margin of error for an estimate [$ME = (t^*)\left(\frac{s_x}{\sqrt{n}}\right)$ [
- I can determine a sample size necessary for a given margin of error
- I can choose the appropriate hypothesis test about means using the t-test {t-test, 2 sample t-test, matched pairs t-test} (following the inference toolbox)
- I can determine degrees of freedom for t-procedures and understand what happens to the graph when the degrees increase
- I can verify conditions which need to be met to run the t-procedures (SRS, Dist normal by CLT or graph if n<30, Independent Samples)
- I can define/calculate a p-value
- I can draw a conclusion for a hypothesis test about means based on the significance level and the p-value and state it in context of the problem
- I can draw a conclusion for a hypothesis test about means based on a confidence interval and state it in the context of the problem
- I can write a null and alternative hypothesis for means and state them in the context of the problem
- I can determine if a test is one or two-tailed and know how this effects the p-value

CHAPTER TWELVE

- I can describe the sampling distribution of p-hat for a single proportion or for a difference of proportions [$\ddot{p}_1 - \ddot{p}_2$]
- I can estimate a population proportion or difference in population proportions using a confidence interval at confidence level C (using the inference toolbox) and state it in the context of the problem [$CI: \ddot{p} \pm (z^*)\left(\sqrt{\frac{p(1-p)}{n}}\right)$]
- I can calculate standard error for the z-procedures for proportions [$SE = \left(\sqrt{\frac{p(1-p)}{n}}\right)$]
- I can define/calculate the margin of error for an estimate [$ME = (z^*)\left(\sqrt{\frac{p(1-p)}{n}}\right)$]
- I can determine a sample size necessary for a given margin of error for a CI for proportions I can choose the appropriate hypothesis test about proportions using the z-test {one proportion z-test, 2 proportion z-test}(following the inference toolbox)
- I can verify conditions which need to be met to run the z-procedures on proportions (SRS, Dist normal by np>10 and n(1-p)>10, (np>5, n(1-p)>5 for two proportion) also St. Dev Formula can be used by Population>10n)
- I can define/calculate a p-value for a sample proportion
- I can draw a conclusion for a hypothesis test about proportions based on the significance level and the p-value and state it in context of the problem
- I can draw a conclusion for a hypothesis test about proportions based on a confidence interval and state it in the context of the problem
- I can write a null and alternative hypothesis for proportions and state them in the context of the problem

CHAPTER THIRTEEN

- I can describe Chi-Square Distributions
- I can recognize when to use a Goodness of Fit Test **or** Test for Independence/Homogeneity
- I can verify conditions for the Chi-Square Tests (SRS, All expected counts>1, 80% expected counts>5)
- I can use percents and bar graphs to compare hypothesized and actual distributions for GOF Test.
- I can use percents and bar graphs to compare distributions for Test for Independence/Homogeneity.
- I can calculate expected counts for Goodness of Fit Test **or** Test for Independence/Homogeneity
- I can determine degrees of freedom for Goodness of Fit Test **or** Test for Independence/Homogeneity.
- I can calculate the chi-square statistic for Goodness of Fit Test **or** Test for Independence/Homogeneity
- I can conduct a Chi-Square Goodness of Fit Test to determine if a population distribution is different from a specified distribution.
- I can perform a Test for Independence to determine if there is an association between two categorical variables.
- I can organize data into a two-way table and enter the table into a matrix on the TI.
- I can determine expected counts, chi-square statistic, and p-value from calculator output.
- I can use calculator output to write a complete Chi-Square significance test.

CHAPTER FOURTEEN

- I can describe conditions necessary to perform inference about the model.
- I can show inferential conditions are met for regression situations.
- I can calculate and interpret a Level C confidence interval for the slope of the true regression line.
- I can interpret the slope of the true regression line in the context of the situation.
- I can perform a significance test on the Ho: slope = 0.
- I can interpret computer output regarding a significance test on the slope of the true regression line.
- I can enter bivariate data into the List Editor.
- I can construct and interpret a Scatterplot.
- I can calculate the LSRL.
- I can interpret r and r2.
- I can construct and interpret a Residual Plot.
- I can perform a LinRegTTest.
- I can use LinRegTTest output to determine SEslope.

OTHER

- I have practiced example A.P. style free response questions which relate to inference and I feel able to answer these types of questions well.
- I have practiced example A.P. style multiple choice questions which relate to inference and I feel able to answer these types of questions well.

Miscellaneous

CALCULATOR

- I have a graphing calculator, it has good batteries, and I feel comfortable using it well.
- I have the programs on my calculator (Catalog Help, Chi-Square GOF, BinomCDFr, GeometricCDRr) that might be useful

FORMULA SHEET & TABLES

- I have a copy of the formulas I am allowed to use on the AP Statistics Exam and I understand how to use them
- I have a copy of the tables I can use on the AP Statistics exam and I understand how to use them

PRACTICE

- I am aware of resources with which I can practice multiple choice questions (Online Website, Online Practice Quiz, AP Statistics Practice Books)
- I am aware of resources with which I can practice free response questions (Online Websites, AP Statistics Practice Books, Past AP Exams)