Exam Prep Overview

March 23, 2022

The following questions outline the past AP Statistics free response questions by topic. All problems and solutions may be found at https://apcentral.collegeboard.org/courses/ap-statistics/exam/past-exam-questions.

Data Analysis

Year	Question	Content
2017	4	Comparing boxplots and using boxplots to classify
2016	1	Describing a distribution and effect of changing a value on mean and median
2015	1	Using boxplots to make decisions
2011B	1	Estimating medians of histograms, comparing histograms, and relationship between mean and median
2010B	1	Comparing distributions (boxplots), stemplots, and comparing boxplots and stemplots
2007B	1	Constructing a stemplot, summarizing a distribution of univariate data (stemplot), and bimodal distribution
2006	1	Comparing distributions of univariate data (dotplots), comparing variability, and measuring center
2005B	1	Describing shape of a stemplot, mean vs. median, and midrange
2004	1	Constructing parallel boxplots, outliers, properties of boxplots, and mean vs. median
2002B	5	Constructing parallel boxplots and comparing distributions of univariate data (boxplots)
2001	1	Identifying outliers and unusual values
2000	3	Graphing and comparing two frequency distributions

Modelling Distributions of Data

Year	Question	Content
2011	1	Assessing normality from summary statistics, calculating and interpreting a z-score, and using z-scores to make a comparison
2009B	1	Estimating median and IQR from a boxplot and linear transformations of data
2008	1	Comparing distributions with boxplots, linear transformations of data, and effect of shape on the relationship between mean and median
2006B	1	Interpreting cumulative relative frequency graphs
1997	1	Interpreting cumulative relative frequency graphs, finding median and IQR from a cumulative relative frequency graph, and comparing center and spread

Describing Relationships

Year	Question	Content
2017	1	Explaining "positive, linear, strong", interpreting slope, and calculating actual value from residual
2016	6	Describing scatterplots, interpreting slope from computer output, estimating medians from a scatterplot, and accounting for a third variable
2015	5	Describing scatterplots, classifying observations, and making a prediction
2014	6	Calculate, interpret, and identify residuals, comparing associations, and multiple regression and variable selection
2013	6	Comparing distributions, describing trends in a scatterplot (timeplot), and moving averages
2012	1	Describing a scatterplot with non-linear association, influential points, and determining which points meet a consumer's criterion
2007B	4	Graphing a least-squares regression line, calculating a residual, and influential points
2005	3	Assessing linearity with residual plots, understanding and interpreting slope, interpreting r-squared, and extrapolation
2003B	1	Influential points
2002B	1	Making a scatterplot, interpreting correlation, assessing linearity, and interpreting r-squared
2002	4	Using regression output to state the equation of a least-squares regression line, finding and interpreting the correlation from computer output, and clusters and influential points
2000	1	Describing scatterplots
1999	1	Using a residual plot to assess linearity, identifying slope and y-intercept from computer output, interpreting slope and y-intercept, making a prediction using a least-squares regression line, and using residuals to estimate actual values
1998	2	Making a histogram of one variable from a scatterplot, describing a histogram, and describing a scatterplot
1998	4	Using regression output to state the equation of a least-squares regression line and analyzing patterns in a residual plot (Note: the residual plot uses predicted values on the horizontal axis instead of the values of the explanatory variable)

Collecting Data

Year	Question	Content
2016	3	Explanatory/response variables, experiment vs. observational study, and confounding
2014	4	Mean vs. median and sampling methods and bias
2013	2	Convenience sampling and bias, selecting an SRS with a random number generator, and stratified sampling
2011B	2	Observational study vs. experiment, scope of inference, and purpose of random assignment
2011	3	Cluster sampling and stratified sampling
2010	1	Treatments, experimental units, response variable and, scatterplots and linearity
2010B	2	Simple random sampling and stratified random sampling
2009	3	Random assignment and non-random assignment
2008	2	on-response bias
2007	2	Control groups, random assignment, and blocking
2007B	3	Blocking and randomization
2006	5	Treatments, randomization, sources of variability, and generalizibility
2006B	5	Response variable, treatments, experimental units, randomization, replication, and confounding
2005	1	Comparing distributions (stemplots), generalizability of results, and sampling variability
2004	2	Blocking and random assignment within blocks
2004B	2	Selection and response bias
2003	4	Random assignment, control groups, and generalizibility
2002	2	Matched pairs experiment and double-blind
2002B	3	Designing experiment and blocking
2001	4	Blocking and purpose of randomization
2000	5	Designing experiment, blocking, and double-blind
1999	3	Experiment vs. observational study, confounding, and cause and effect
1997	2	Designing experiment and blocking

Probability

Year	Chapter	Content
2017	3	Normal probability, general multiplication rule (tree diagram), and conditional probability
2017	6	Probabilities of different random assignments (coin vs. chip) and which method of random assignment is best
2014	2	General multiplication rule, informal inference, and simulation design
2011	2	Conditional probability from a two-way table, independence of two events, and segmented bar charts and independence
2009B	2	Conditional probability and multiplication rule
2003B	2	Two-way tables, conditional probability, and independence
2001	3	Simulation
1997	3	Conditional probability

Random Variables

Year	Chapter	Content
2016	4	Multiplication rule, geometric probability calculation, and informal p-value and conclusion
2015	3	Discrete probability distributions, expected value, conditional probability, and conditional expected value
2013	3	Normal probability calculation and mean and standard deviation of a sum of random variables
2012	2	Discrete probability distributions, expected value of a discrete random variable, application of expected value, and normal probability calculation
2011B	3	Geometric probability, binomial probability, and cumulative binomial probability
2010B	3	Binomial distribution, expected value, and binomial calculations
2010	4	Mean and standard deviation of a binomial distribution, binomial calculations, and stratified sampling
2008	3	Expected value and basic probability rules
2008B	5	Combining normal random variables and normal calculations
2006B	3	Normal calculations, binomial calculations, and inverse normal calculations
2005	2	Expected value, median of a discrete random variable, and relationship of mean and median
2005B	2	Mean and standard deviation of a discrete random variable, combining independent random variables, and linear transformations of a random variable
2004	3	Binomial conditions, multiplication rule, interpreting probability, and generalizability
2004	4	Conditional probability and expected value
2003	3	Normal calculations and binomial calculations
2002B	2	Addition rule, expected value, and conditional probability
2002	3	Normal calculations and combining independent random variables
2001	2	Expected value
1999	4	Normal calculations, binomial calculations, and outlier rules
1999	5	Sample space and expected value
1998	6	Normal calculations, simulation, and expected value

Sampling Distributions

Year	Chapter	Content
2015	6	Choosing a sampling method, describing distribution of a sample, describing distribution of a sample mean, and comparing variability of sampling distributions
2014	3	Normal probability calculation, sampling distribution of, and probability rules
2012	6	Selecting a SRS, standard error of the mean for a simple random sample, standard error of the mean for a stratified random sample, and how stratified random sampling reduces variability
2010	2	Sampling distribution of the sample mean and probability calculation for a total
2009	2	Inverse Normal calculation, binomial probability calculation, and probability calculation for the sample mean
2008B	2	Properties of estimators: bias and variability
2007B	2	Addition rule, binomial probability calculation, and sampling distribution of the sample mean
2007	3	Sampling distribution of the sample mean, probability calculation for the sample mean, and central Limit Theorem
2006	3	Normal probability calculation, binomial probability calculation, and probability calculation for a sample mean
2004B	3	Normal probability calculation and interpretation and probability calculation and interpretation for a sample mean
1998	1	Sampling distribution of the sample mean and effect of sample size on shape of sampling distribution

Confidence Intervals

Year	Question	Content
2017	2	One sample z interval for a proportion and using interval to estimate total cost
2015	2	Using confidence intervals to make decisions and effect of quadrupling sample size on margin of error
2013	1	Interpreting stemplots and one sample t interval for a population mean
2011B	5	One-sample z interval for a proportion, using a CI to assess a claim, and determining sample size
2011	6	1 sample z interval for a proportion, tree diagrams, and using information from tree diagram to create a new confidence interval
2010	3	Interpreting confidence level, using confidence intervals to make decisions, and determining sample size (CI for a proportion)
2010B	4	One sample z-interval for a population proportion and effect of sampling without replacement
2008B	3	Determining sample size (CI for a mean) and practical constraints
2005	5	Sources of bias in a survey, determining sample size (CI for a proportion), and stratified random sampling
2003	6	Interpreting a graph, one-sample z-interval for a population proportion, and using confidence intervals to make decisions
2003B	6	One-sample z-interval for a population proportion, interpreting confidence level, and determining sample sizes for different sub-groups (CI for a proportion)
2002	1	Precision of interval estimates and using confidence intervals to make decisions
2002B	4	One-sample z-interval for a population proportion, interpreting confidence level, and using confidence intervals to make decisions
2000	2	Conditions for a one-sample t-interval for a population mean
2000	6	One-sample z-interval for a population proportion, combining Normal random variables, independence, and anticipating patterns in a scatterplot

Significant Tests

Year	Question	Content
2012	5	Type II error and consequence, conclusion to a significance test for a single proportion, and voluntary response bias
2009B	4	Random assignment in blocks and increasing the power of a test
2009B	5	One sample t test for a mean and using simulation to test a standard deviation
2009	6	Stating hypotheses, relationship between mean and median, testing for skewness, and creating a test statistic
2008B	4	Experimental design and type I and II errors and consequences
2006B	6	Stating hypotheses, conditions for a one sample z test for a proportion, binomial probability calculations, significance levels, calculating p-values and drawing conclusions, and improving a study
2005	4	One sample z test for a proportion
2005B	6	One sample t test for a mean, normal probability calculation, multiplication rule for independent events, and using simulation to estimate a probability
2004	6	One sample t interval for a mean, relationship between confidence intervals and significance tests, and one-sided confidence intervals
2003	1	Constructing boxplots, using boxplots to compare variability, and stating hypotheses
2003	2	Stating hypotheses and type I and II errors and consequences
1998	5	One sample z test for a proportion and effect of nonresponse

Inference for Two Populations

Year	Question	Content
2016	5	One sample z interval for a proportions, reasons for the large counts condition, and why a 2 sample z interval is not OK
2015	4	Two sample z test for a difference in proportions (experiment)
2014	5	Paired t test
2013	5	Scope of inference, conditions for a two-sample z test for a difference in proportions, and logic of inference, simulation of sampling distribution
2012	3	Comparing histograms and conditions for two-sample t procedures
2012	4	Two-sample z test for a difference in proportions
2011	4	Two-sample t test for the difference between two means
2010	5	·Two-sample t test for the difference between two means
2009B	3	Two-sample z test for the difference between two proportions
2009	4	Two-sample t interval for the difference between two means and using a confidence interval to test hypotheses
2009	5	Interpreting a P-value for a two-sample ztest for the difference between two proportions, using a P-value to make a conclusion, and type I and type II errors and consequence
2009B	6	Double-blind experiments, two-sample z interval for the difference between two proportions, and relative risk
2008B	1	Constructing and comparing dotplots and logic of hypothesis tests
2008B	6	Interpreting scatterplots, paired t test, and creating a classification rule
2008	4	Constructing and interpreting scatterplots and standard error of the average of two proportions

2007	1	Interpreting standard deviation, comparing center, and using a confidence interval to test hypotheses
2007	4	Paired t test
2007	5	Experiment versus observational study, stating hypotheses, two-sample z test for the difference between two proportions (conditions only), and interpreting a P-value and making a conclusion
2007B	5	Two-sample t test for the difference between two means
2006B	2	Two-sample z interval for the difference between two proportions and using a confidence interval to test hypotheses
2006B	4	Paired t test
2006	4	Two-sample t interval for the difference between two means and using a confidence interval to test hypotheses
2005B	3	Completely randomized design versus matched pairs design and two-sample t test versus paired t test
2005B	4	Paired t interval and using a confidence interval to assess significance
2005	6	Two-sample t interval for the difference between two means and constructing and interpreting an interaction plot
2004B	4	Two-sample t interval for the difference between two means and two-sample versus paired t interval
2004B	5	Boxplots, one-sample t interval for a mean (conditions only), and two-sample t test for the difference between two means (conditions only)

Chi-square Tests

Year	Question	Content
2017	5	Chi-square test for independence
2016	2	Chi-square test for homogeneity and follow-up analysis
2014	1	Conditional relative frequency, association between categorical variables, and chi-square test of independence
2013	4	Chi-square test for independence
2011B	4	Chi-square test for independence and type I and type II errors
2010B	5	General addition rule, conditional probability, independence, and chi-square test for independence
2010	6	Graphing and comparing distributions and evaluating and using an unfamiliar test statistic
2009	1	Graphing categorical data, describing an association between categorical variable, choosing a correct inference procedure, and stating hypotheses
2008	5	Chi-square test for goodness-of-fit and follow-up analysis
2006	6	Stating hypotheses, calculating a test statistic and p-value, rejection regions, and identifying simulated distributions of a test statistic
2004	5	Chi-square test for independence and scope of inference
2003	5	Chi-square test for independence
2003B	5	Multiplication rule for independent events, expected value, and chi-square goodness-of-fit test
2002B	6	Two-sample t test, chi-square test for homogeneity, and comparing distributions using graphs
1999	2	Chi-square test for independence
1998	3	Methods of random assignment and choosing the correct inference procedure

Linear Regression Inference

Year	Question	Content
2011	5	Regression output, interpreting slope, meaning of t test for slope (conclusion only)
2011B	6	Interpreting slope, extrapolation, sampling distribution of in a regression context, and optimal design for estimating slope
2010B	6	Interpreting the slope of a least-squares regression line, interpreting a residual, using the residuals to estimate an effect, testing for a difference between two slopes using a confidence interval, and using two different least-squares regression lines to estimate an effect
2008	6	Two-sample t test for a difference in means, stating the equation of a least-squares regression line from computer output, interpreting the slope of a least-squares regression line, t test for a slope, and comparing inference methods
2007	6	Interpreting the slope of a least-squares regression line, using a model with no constant term, t test for slope with : = 1, graphing a multiple regression model with an indicator variable, and interpreting the coefficients of a multiple regression model
2007B	6	Two-sample z test for a difference of proportions, confidence interval for slope, using a confidence interval to make a decision, and using transformed data and a least-squares regression line to make predictions
2006	2	Stating the equation of a least-squares regression line from computer output, interpreting the standard deviation of the residuals, and interpreting the standard error of the slope
2005B	5	Stating the equation of a least-squares regression line from computer output, interpreting the slope and y intercept, and confidence interval for slope
2004B	1	Describing a scatterplot, interpreting r2, and interpreting a residual plot for a least-squares regression line using transformed data
2001	6	Making graphs and comparing two distributions, t test for slope, and classifying a new observation
1997	6	Making predictions using least-squares regression lines, including transformed data, determining if models are appropriate, and creating a better model