

# BAT to Lists for AP Stat Course Objectives

## **I. Creating and Describing Graphs**

- accurately create dot plot, bar graph (includes stacked and grouped), stem and leaf (don't forget "key"), histogram (remember to label "bins" correctly --- continuous values --- right number in next bin; discrete values centered under bin), modified box plot (use "\*" for outliers) TITLE & LABEL!!
- interpret ogives (find certain percentiles)
- interpret and compare graphs in context (no pronouns)
- determine outliers algebraically and from standard deviations
- describe using SOCS or CUSS (no pronouns, use #'s and "greater", "less" **not** "while")
- distinguish BIAS from VARIABILITY (think about target and buckshot --- bias is "aim from center", variability is "spread apart")

## **II. Sampling Techniques & Experimental Design**

- state difference between sampling and census
- identify populations and samples
- discuss biased (systematically favors certain outcomes) sampling methods: voluntary, convenience, quota, undercoverage (not included), nonresponse(choose to not respond), response (wording, social desirability)
- discuss clustering and stratifying
- discuss difference between observational study and experimental study
- outline an experimental study --- bullets or paragraph form (must), diagram (optional); assign random digits correctly; block correctly with reason
- know subjects, treatments, levels, factors, placebo effect, blind, double blind
- purpose of control group, randomization, replication
- randomized comparative design vs blocking vs matched pairs

## **III. Probability Distributions: Binomial & Normal Distributions; Combining Random Variables**

- create and interpret probability distribution table (2 criteria)
- know if data is discrete or continuous
- calculate expected value and standard deviation (using lists) from probability distribution table (use correct stand dev in calc)
- distinguish counts from relative frequency
- distinguish relative frequency from cumulative relative frequency

- distinguish Binomial from "wait time" (4 conditions for Binomial)
- write Binomial distribution notation correctly
- calculate probability for Binomial distribution long hand and with calculator
- calculate probability for wait time problem
- use binompdf and binomcdf correctly (difference? arguments?)
- calculate the complement using binomcdf ( what X value is last arg?)
- state %'s for Empirical Rule
- write Normal distribution notation correctly (both when given and when calculated from Binomial distribution)
- calculate probability for single observation and for sampling distribution (changes n value in standard error)
- discuss mutually exclusive, disjoint, independent events
- calculate union of 2 mutually exclusive and 2 non-mutually exclusive events
- calculate intersection of 2 independent events
- know to use a probability statement to determine if 2 events are independent
- determine condition probability from given probability, contingency table, or tree diagram
- create tree diagram; calculate intersection from values on tree
- interpret (in context) all values shown on a tree diagram
- use a tree you created for  $P(A|B)$  to calculate  $P(B|A)$
- given  $Z = X + Y$ , calculate  $\mu_Z = \mu_{X+Y} = \mu_X + \mu_Y$
- given  $Z = X + Y$ , where  $X$  and  $Y$  are independent events, calculate  $\sigma_Z = \sqrt{\sigma_X^2 + \sigma_Y^2}$
- given  $H = a + bx$ , calculate  $\mu_H = \mu_{a+bx} = a + b\mu_x$
- given  $H = a + bx$ , calculate  $\sigma_H = \sigma_{a+bx} = b\sigma_x$

#### IV. Inference

- follow template (or use PANIC) to create and interpret confidence intervals for 1 & 2 sample means and proportions
- follow template (or use PHANTOMS) to run and draw conclusions from hypothesis tests
- input data in calc lists and use 1<sup>st</sup> var stats if sample statistics not given for means problem
- create and interpret boxplot or NPP if CLT not applicable
- differentiate between matched pairs and 2 sample test
- correctly name appropriate confidence interval or test
- state and check necessary assumptions (conditions)

- determine sample size needed for particular margin of error (use  $p^*$  if sample statistics not given for proportions)
- discuss how sample size impacts width of confidence interval
- define meaning of "95% confident" (see Test CH 9 & 10 mult choice and several take home quizzes for correct verbage)
- define all necessary parameters using correct notation
- give df's for t-dist (1 sample ---  $n - 1$ ; 2 sample --- get from calc) and  $\chi^2$  Test dist {GOF ---  $n - 1$ ; Homogen & Assoc ---  $(n - 1)(m - 1)$ , get from calc}
- calc exp values for  $\chi^2$  for  $1 \times n$  contingency table by hand
- calc exp values for  $\chi^2$  for  $n \times m$  contingency table using matrices
- use  $\chi^2$  cdf (GOF) after calc  $\chi^2$  by hand
- use  $\chi^2$  Test for GOF test
- use  $\chi^2$  Test for Homogen and Association
- discuss impact of particular component in  $\chi^2$
- read computer printout for inference for regression (ZOMBIES)
- calculate missing values in computer printout (t-statistic, p-value,  $se_b$ )
- discuss Type I, Type II errors in context and consequences of each
- state  $P(\text{Type I}) = \alpha$        $P(\text{Type II}) = 1 - \beta$       Power =  $\beta$

## V. Linear Regression & Inference for Regression

- create scatterplot of data
- write linear regression model in context of problems
- interpret slope, y-intercept, correlation coefficient, and coefficient of determination in context
- create and interpret residual plot
- calculate and interpret residuals (over/under estimate)
- calculate observed values from residual
- discuss how influential points and outliers affect correlation and LSRL
- use computer output to create/discuss regression model
- use computer output to calculate test statistic,  $se_b$ , p-value
- use computer output to create a confidence interval or run a hypothesis test