Project Specific Guidelines: t-Test Project
Math 2400 – Elementary Statistics

Project Design

There are 3 project options for the t-test project. (See class t-test handout for more examples.)

1. A 1-sample t-test
   Required elements: one population, one quantitative variable, a *specific value* for hypothesis
   Example scenario:
   Population: All 2-bedroom apartments in Lumpkin County
   Variable: monthly rent
   Research question: Is the average rent for a 2 bedroom apartment in Lumpkin County more than $600 per month?
   Hypothesis and rationale: "We predicted that the average monthly rent for a 2 bedroom apartment in Lumpkin County would be higher than $600. A college planning guide stated that students could probably share a 2-bedroom apartment off-campus 'for about $600 a month.' Based on casual observation, we believe that on average, this estimate is too low."

2. A matched pairs t-test
   Required elements:
   a) one quantitative variable and two populations in which individuals can be matched
   OR
   b) one population and two quantitative variable values for each individual
   In both (a) and (b) the hypothesis is about the computed difference between the two related values
   Example scenario for (a):
   Populations: All canned vegetables sold at Kroger; all canned vegetables sold at Wal-Mart
   Variable: price (*specifically, the ***difference*** in price charged for identical items at each store)
   Research question: On average, are canned vegetables cheaper at Wal-Mart than at Kroger?
   Hypothesis and rationale: "We predicted that on average, Wal-Mart would charge less for the same canned vegetable item. This prediction is based on the general observation that things seem to cost less at Wal-Mart."

   Example scenario for (b):
   Population: All NGCSU students
   Variables: rating (1 – 10) of the taste of Coke; rating (1-10) of the taste of Pepsi (*specifically, taste tests are conducted "blind" and the ***difference*** in ratings is computed for each participant)
   Research question: On average, do NGCSU students prefer Coke over Pepsi?
   Hypothesis and rationale: "We predicted that on average, NGCSU students would rate Coke better in taste than Pepsi. This prediction is based on the fact that in such close proximity to Atlanta, the Coca Cola capital, Coke is often the preferred soft drink."

3. A 2-sample t-test (independent samples)
   Required elements: two populations, one variable
   Example scenario:
   Populations: 1) All current NFC football players; 2) All current AFC football players
   Variable: age
   Research question: Is there a significant difference between the average age of NFC players and AFC players? (*note: here, "significant" means statistically significant*)
   Hypothesis and rationale: "We predicted that there might be a difference between the average age of NFC and AFC players. In recent years, the AFC has been perceived as the stronger conference; one could theorize that on average, they have older players who are wiser and more experienced; OR one could theorize that on average, they have younger players who are in better shape and have more stamina. The purpose of this study is to determine if any such age discrepancy exists."

Project Report

Refer to Project Overview for general guidelines and full report outlines. The items below address required details specifically for the t-test project report.

Results: Statistical Analysis. Checklist of relevant details:

a) which type of t-test you are conducting (1-sample, matched pairs, etc.)
b) if matched pairs, clearly illustrate the design– how the values are matched with each other, etc.
c) whether your test was a one-tailed or two-tailed test; if one-tailed, whether left- or right-tailed

Scoring Guide for Project Report

	Below Standard	Collegiate Quality	Flawless Excellence	*Total*	
Category	**0 – 3 Pts**	**4 Pts**	**5 Pts**	**Possible**	**Earned**
Project Plan	No project plan or Incomplete project plan	Project plan completed and submitted, but final approval not obtained	Project plan completed, submitted, and approved.	5	
Overview of Research	Research question not stated clearly Hypothesis not stated Rationale not explained	Two of the three criteria at right are satisfied.	1) Research question stated clearly 2) Hypothesis stated clearly 3) Rationale explained clearly	5	
Research Population Specified	Target population(s) of research project not defined or poorly defined	Target population(s) defined, but not completely appropriate	Target population(s) well defined and appropriate	5	
Definition of Variables	Research variable not adequately defined.	Research variable named, but details are lacking on how variable is measured	Research variable named; measurement and possible values of variable are clearly defined	10	
Data Collection	Poor design, description, or implementation	Two of the three criteria at right are satisfied.	1) Data collection procedure explained fully 2) Sound measures taken to avoid bias explained 3) Representative sample addressed adequately	10	
Hypotheses	Null and alternative hypotheses not stated or incorrect	Null and alternative hypotheses stated correctly in words OR in mathematical terms.	Null and alternative hypotheses stated correctly in words AND in mathematical terms.	10	
Descriptive Statistics: Research Variable	Descriptive statistics for variables omitted or not given clearly for **each** sample	Mean and standard deviation of each variable is given clearly for **each** sample	For **each** sample, research variable is described thoroughly with mean, standard deviation, and 5-number summary.	10	
Data Representation	Report does not use sufficient charts or graphs to display data.	All variables are represented with appropriate tables and charts for **each** sample.	1) All variables represented with appropriate charts and tables for **each** sample. 2) All raw data is included in table(s) in an appendix	10	
Statistical Analysis: Selected Test	Inappropriate statistical tests conducted OR statistical tests not explained well	Appropriate statistical test is conducted correctly and explained adequately	Correct test is conducted and explanation of all details of test is thorough, articulate, and precise	5	
Statistical Analysis: Execution	Statistical test not conducted or reported correctly	Three of the four criteria at right are satisfied	For required test: 1) t statistic is reported 2) t statistic is accurate 3) p value is reported 4) p value is accurate	10	
Interpretation of Results	p-values not interpreted correctly or consistently	Results are interpreted correctly and consistently with respect to: 1) significance 2) rejection of null hypothesis 3) real world conclusion about subject being studied	Interpretation of p-values satisfies all criteria at left AND includes clear discussion of significance levels	10	
Conclusion and Discussion	Implications of results not discussed; no attempt to explain findings. Report draws unwarranted conclusions or uses inappropriately certain language (e.g., “we proved”, “our hypothesis is true”)	Adequate discussion of results and their practical implications; reasonable explanation of findings offered; no unwarranted conclusions.	Discussion of results is insightful; adds meaning and significance to the report; no unwarranted conclusions.	5	
Organization and Readability	Report is poorly organized and hard to follow; charts and tables not embedded in report; many writing errors, awkward sentences	Report is reasonably organized and readable with few writing errors; charts and tables embedded in report	Report is exceptionally well organized and well written, with all charts and tables embedded in report	5	