



AP[®] Statistics 2003 Scoring Commentary

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Question 1

Sample A – Score 4

This student addressed all the expectations in the scoring guidelines including clearly indicating that the issue of bias was considered by looking at the medians. It was noted that there was very little difference between the two groups and hence bias was not a factor in this decision.

Sample B – Score 3

In part (c), the student is attempting to deal with the lack of connection between the proposed hypotheses and the teacher's question, but has not quite succeeded, so part (c) is scored as partially correct.

Question 2

Sample A – Score 4

In part (a) the student correctly defined the parameter in words, used standard notation to identify the parameter in the hypotheses, and the hypotheses were correctly stated. In part (b) the student correctly defined both types of errors in the context of the problem and stated both economic consequences clearly.

Sample B – Score 4

In part (a) the student correctly defined the parameter in words, used standard notation to identify the parameter in the hypotheses, and the hypotheses were correctly stated. In part (b), the student provided correct textbook definitions of Type I and Type II errors. Then those errors were correctly described in context of the problem, clearly indicating that the law firm would not recover expenses with the Type I error and the law firm would have "missed out on an opportunity" with the Type II error.

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Question 3

Sample A – Score 4

In part (a), the student identifies the regions of interest in the figure, computes the corresponding z -scores, correctly evaluates the associated left-tail probabilities, and combines them to obtain the desired proportion. Part (b) contains a graph illustrating the desired proportion, followed by the clear evaluation of that proportion. The student verifies the binomial nature of the situation, shows the correct formula with proper values substituted, and evaluates the desired probability.

Sample B – Score 4

In part (a) the student clearly identifies the desired region in words and calculates the proportion, both by dealing directly with the complementary region. Part (b) contains a good graph with appropriate calculations supporting the calculated proportion. In part (c) the student identifies the binomial situation and its parameters in three distinct ways, each of which is correct – using a formula with values substituted, in words, and as a calculator command.

Question 4

Sample A – Score 4

In part (a) this student has identified a plausible problem, i.e. that the group members may belong to an outside organization. Membership in a massage therapy club could lower their stress during the experiment, and this could be confounded with the effect of the tai chi or yoga. Randomization “more or less” distributes the group evenly. In part (b) this student correctly states that the control group would allow a clear comparison with one or both of the treatments, and the absence of a treatment. Finally, in part (c) this student not only correctly identified the problem as the subjects being volunteers, but went on to explain why the use of volunteers might be a problem (i.e., the volunteers “are very likely the ones who needed the stress reduction the most”).

Sample B – Score 4

In part (a) this student has identified a plausible problem, i.e., that the group members “like each other.” Randomization will “split you up” so that the group of friends is not congregated. In part (b) this student correctly states that the control group would allow a clear comparison between a possible change in stress due to a treatment, and a potential increase in stress at the end of the 10 weeks. In part (c), this student not only correctly identified the problem as the subjects being volunteers, but went on to explain why the use of volunteers might be a problem, because volunteers “just don’t represent” the people in the large company.

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Question 5

Sample A – Score 4

In part I, the independence hypotheses are given. Part II states the name of the test, displays a table of expected counts, and checks conditions. In part III, the Chi-square statistic is calculated. Finally in part IV, the conclusion is presented in the context of the problem.

Sample B – Score 4

The statement of the hypotheses is correct, although the use of the word “association” is preferred over the use of the word “relationship.” The assumptions for the test are given at the bottom of the response, and it is clear that the student inspected all 10 of the expected cell counts because these are displayed in the calculation of the Chi-square statistic. A complete interpretation in context of the p -value is given; not specifying the number of degrees of freedom was considered only a minor error.

Question 6

Sample A – Score 4

In part (a), the student clearly explained the choice of vans using the graph and made notations on the graph to illustrate the answer. The assumption that “the population is normal” in part (b) is incorrect, but the other assumptions are well stated and checked. Since the investigative task has so many parts, this was not considered to be enough of an error to reduce the score from a 4 to a 3. The mechanics are correct, and the interpretation of the interval properly included the population of interest, “similar markets.” In parts (c) and (d), the student consistently used the word “shuttles” instead of “coaches.” Since these were contrasted with vans, the meaning was unambiguous, and the student was not penalized. In both parts, the student clearly used the confidence interval values to justify the decisions.

Sample B – Score 4

The student clearly referred to the graph in part (a). In part (b), the fact that the population of interest is “similar markets” is not clearly stated in either the definition of the parameter or the interpretation of the confidence interval. This was considered a minor error in the context of the investigative task and did not reduce the score from a 4 to a 3. The conditions were nicely stated and checked. The mechanics were well done. The first sentence after the confidence interval computations is a statement of the endpoints of the confidence interval and would not be given credit as an interpretation. The second sentence is the actual interpretation of the interval. Although there is no explicit reference to 0.76 in part (c), the student clearly relates the confidence values to the region for which vans have a higher expected return. In part (d), the student nicely contrasts the profits for coaches and vans when the market is strong and suggests that the market is likely to be strong based on the confidence interval from part (b).