AP® Statistics
2002 Scoring Commentary

Question 1

Response: 1 of 2

Score 4:

This response earned a score of 4 because all three parts are essentially correct. In part (a), the student has accurately described the early vacillating behavior of the estimates and then the increasing precision of the recent experiments. In part (b), the ambiguous statement "no experiment contains zero" is recovered by the addition of the construction "estimate +/- margin of error", which was regarded as equivalent to discussing an interval.   Note the correct use of "estimate – margin of error" as a number and the establishment of the link to Newtonian theory by referring to the value of gamma as 1.0. In part (c), the student correctly notes that 17 of the 21 experiments provide intervals that contain 1, and indicates the strong support for Einstein's theory.

Response: 2 of 2

Score 3:

This response earned a score of 3. In part (a), this student correctly notes that the margins of error have gotten smaller, and that this is evidence that the precision of the estimates of gamma has increased. In part (b), the student links the evidence from these experiments as indicating no support for the Newtonian theory, but uses an ambiguous phrase, "estimates, even including their margin of error." This was not sufficiently precise communication to be scored as essentially correct, but the response did convey the sense of an interval and was scored as partially correct. Finally, in part (c), the student repeats the earlier construction of "inclusion in a margin of error," but this was not counted against him or her again. The link between data and theory is clearly established in the first sentence, and this was scored as essentially correct.

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Question 2

Response: 1 of 2

Score 4:

This response earned a score of 4. It uses an appropriately paired design and then explains why that design is used. The design randomly assigns volunteers to two groups and the method of randomization is explained. In part (b), the response clearly identifies that the volunteers and "boot evaluators" would not know which treatment the boots received.

Response: 2 of 2

Score 3:

This response earned a score of 3. It uses an appropriately paired design and accounts for randomization in that design, although the description of randomization is somewhat minimal. Note that in part (b), the student does not identify the experimenters as the individuals who assess the water damage to the boots. This response earned essentially correct for the design and randomization, but only partially correct for the response in part (b).

Question 3

Response: 1 of 2

Score 4:

This response earned a score of 4. In part (a), the student correctly computes the probability of running a mile faster than 4.2 minutes. Parts (b) and (c) are computationally correct with complete communication.

Response: 2 of 2

Score 3:

This response earned a score of 3. In parts (a) and (b), the responses are essentially correct because the computations and explanations are complete. However, in part (c), while a correct approach is demonstrated, the probability that is computed from the z-score is incorrect.

Question 4

Response: 1 of 2

Score 4:

This response earned a score of 4, since all four elements are essentially correct. The work in parts (a) and (b) indicate that the student is able to interpret computer output. Note that in part (b) the student includes a precise interpretation of the correlation coefficient and, although not required, the coefficient of determination.

Response: 2 of 2

Score 3:

This response earned a score of 3. In part (a), the student is unable to interpret the given computer output. A correct calculation and interpretation of the correlation coefficient are given in part (b). The graph in part (c) enhances the student's explanation of the negative correlation in the restricted domain.

Question 5

Response: 1 of 2

Score 4:

This response earned a score of 4. The student provides an excellent discussion of requirements for using the selected test (2-sample t-test), including the fact that the population standard deviation is not known. Computation of the p-value includes use of proper notation for probabilities, and the linkage from computation to decision uses a careful interpretation of p-value.

Question 5 (cont'd.)

Response: 2 of 2

Score 3:

Part (a) of this response is essentially correct. This response earned a score of 3, however, because in part (b) the student fails to check for the requirements for using the two-sample *t*-test related to the underlying population distribution. Simply assuming that the distribution is normal is not sufficient, especially since some of the sample information indicates noticeable skewness. The student provides linkage between computation and decisions in two ways. An alpha value and its associated rejection region are indicated in a sketch, and a careful interpretation of *p*-value is used in the concluding paragraph.

Question 6

Response: 1 of 2

Score 4:

This response earned a score of 4. In parts (a) and (b), the interpretations of the confidence interval and 95 percent confidence, respectively, are well stated in the context of the problem. In both parts (a) and (c), the student notes that one could not be sure that the population size is large enough to satisfy one of the assumptions underlying the statistical approach used. In part (d), the response gives an acceptable explanation and is essentially correct.

Response: 2 of 2

Score 3:

This response earned a score of 3. A correct interpretation of the confidence interval in part (a) is found in part (b). The meaning of 95 percent confidence is not given in part (b). In part (c), the conclusions are first stated in terms of the proportions being tested. They are then used to address the question as to whether the order in which the comedy shows were listed made a difference. In part (d), the student notes that the estimates should be pooled only when they are estimating a common value. Since the proportions of S responses depend on the question, pooling is not valid here.