



AP[®] Statistics 2005 Scoring Guidelines Form B

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Question 1

Solution

Part (a):

The distribution is skewed to the left (or toward the lower values).

Part (b):

Since the distribution is skewed towards the lower values, the mean will be pulled in that direction. Thus, the instructor should report the median to motivate her students.

Part (c):

Step 1: Correct Mechanics:

$$\text{midrange} = \frac{64 + 95}{2} = 79.5$$

Step 2: Identify the midrange as a measure of center.

Step 3: Correct rationale:

The maximum provides information about the upper tail, more specifically the upper extreme value. The minimum provides information about the lower tail, more specifically the lower extreme value. By averaging these two values and creating the midrange, we are creating a statistic that provides the halfway point between the two extremes. This statistic is a measure of center.

Scoring

Each part is scored as essentially correct (E), partially correct (P), or incorrect (I).

Part (a) is essentially correct (E) if the student states that the distribution is skewed and indicates the direction.

Part (a) is partially correct (P) if the student:

- Recognizes that the distribution is skewed but either does not mention the direction or does not indicate the correct direction; OR
- says that the distribution is not symmetric; OR
- says the distribution is not normal.

Part (a) is incorrect (I) if the student says the distribution is bell-shaped or roughly normal.

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Question 1 (continued)

Part (b) is scored as essentially correct (E) if the median is chosen and a correct rationale based on the skewness of the distribution is provided.

Part (b) is partially correct (P) if the median is chosen, but the rationale is weak OR the mean is chosen based on a weak rationale.

Part (b) is incorrect (I) if no rationale is provided for the chosen statistic OR the mean is chosen based on a flawed rationale.

Part (c) is scored as essentially correct (E) if all three steps are essentially correct.

Part (c) is partially correct (P) if two steps are essentially correct.

Part (c) is incorrect (I) if at most one step is correct.

Note: Step 3 is essentially correct if the student provides a rationale that appeals to the midrange as a value in the middle of two extremes OR that appeals to the midrange as a middle value and a correct rationale of why it is not a measure of spread OR appeals to the property that adding a constant to every observation will shift the midrange by the amount of the constant while measures of spread are unaffected by adding a constant to every observation.

4 Complete Response (3E)

All three parts essentially correct

3 Substantial Response (2E 1P)

Two parts essentially correct and one part partially correct

2 Developing Response (2E 0P or 1E 2P)

Two parts essentially correct and zero parts partially correct

OR

One part essentially correct and two parts partially correct

1 Minimal Response (1E 1P or 1E 0P or 0E 2P)

One part essentially correct and either zero parts or one part partially correct

OR

Zero parts essentially correct and two parts partially correct

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Question 2

Solution

Part (a):

The mean of C is $0 \times 0.4 + 1 \times 0.3 + 2 \times 0.2 + 3 \times 0.1 = 1$.

The standard deviation of C is $\sqrt{(0 - 1)^2 \times 0.4 + (1 - 1)^2 \times 0.3 + (2 - 1)^2 \times 0.2 + (3 - 1)^2 \times 0.1} = 1$.

Part (b):

Let $T = C + A$, where A is the total number of adult tickets purchased by a single customer, denote the total number of tickets purchased by a single customer.

The mean of T is $\mu_T = \mu_C + \mu_A = 1 + 2 = 3$.

The standard deviation of T is $\sigma_T = \sqrt{\sigma_C^2 + \sigma_A^2} = \sqrt{1^2 + 1.2^2} = \sqrt{2.44} = 1.562$.

Part (c):

Let $M = 15 \times C + 25 \times A$ denote the total amount of money spent per purchase.

The mean of M is $\mu_M = 15\mu_C + 25\mu_A = 15 \times 1 + 25 \times 2 = \65 .

The standard deviation of M is $\sigma_M = \sqrt{15^2 \sigma_C^2 + 25^2 \sigma_A^2} = \sqrt{225 \times 1^2 + 625 \times 1.2^2} = \sqrt{1125} = \33.54 .

Scoring

Each part is scored as essentially correct (E), partially correct (P), or incorrect (I).

Part (a) is essentially correct (E) if both the mean and the standard deviation of C are calculated correctly and the work is shown, with the exception of minor arithmetic errors.

Part (a) is partially correct (P) if either the mean or the standard deviation of C is calculated correctly and the work is shown.

Note: The variance and the standard deviation of C are both 1. If the variance is reported instead of the standard deviation, the response is scored as (P).

Part (a) is incorrect (I) if both the mean and the standard deviation of C are calculated incorrectly OR if no work is shown.

Notes:

1. Unsupported answers will be scored as incorrect.
2. If the student incorrectly calculates the mean and/or standard deviation in part (a) and then correctly uses those values in parts (b) and (c), there will be no second penalty.

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Question 2 (continued)

3. Standard notation for means (μ_C, μ_A, μ_T , and μ_M), variances ($\sigma_C^2, \sigma_A^2, \sigma_T^2$, and σ_M^2), and standard deviations ($\sigma_C, \sigma_A, \sigma_T$, and σ_M) are acceptable without definition. If nonstandard notation, such as p_C, p_A, p_T , and p_M , is defined correctly for this problem, then it will be scored as essentially correct. Nonstandard notation, without a definition, will be scored at most partially correct.

Part (b) is essentially correct (E) if both the mean and the standard deviation of T are calculated correctly and the work is shown, with the exception of minor arithmetic errors.

Part (b) is partially correct (P) if either the mean or the standard deviation of T is calculated correctly.

Part (b) is incorrect (I) if both the mean and the standard deviation of T are calculated incorrectly OR no work is shown.

Part (c) is scored as essentially correct (E) if both the mean and the standard deviation of M are calculated correctly and the work is shown, with the exception of minor arithmetic errors.

Part (c) is partially correct (P) if either the mean or the standard deviation of M is calculated correctly.

Part (c) is incorrect (I) if both the mean and the standard deviation of M are calculated incorrectly OR if no work is shown.

4 Complete Response (3E)

All three parts essentially correct

3 Substantial Response (2E 1P)

Two parts essentially correct and one part partially correct

2 Developing Response (2E 0P or 1E 2P)

Two parts essentially correct and zero parts partially correct
 OR
 One part essentially correct and two parts partially correct

1 Minimal Response (1E 1P or 1E 0P or 0E 2P)

One part essentially correct and either zero parts or one part partially correct
 OR
 Zero parts essentially correct and two parts partially correct

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Question 3

Solution

Part (a):

Each of the 100 selected people will be assigned a unique random number using a random number generator. A list of names and numbers will be created and sorted from smallest to largest by the assigned numbers (and carrying along the name). The first 50 people on the list will be asked to apply the new compound to their right arm and the other 50 people will be asked to apply the current compound to their right arm. The compounds will be put in identical, unmarked tubes so neither the participants nor the researchers know which compound is being applied. The analysts will be the only people who know which participants received which compound. Each person will be randomly assigned to a bin by assigning random numbers to bins using a random number generator. The first person on the list will be assigned to the bin with the smallest number, the second person on the list will be assigned to the bin with the second smallest number, and so on. After each person inserts his or her right arm into the assigned bin for one minute, the number of mosquito bites will be counted. The mean number of mosquito bites for the two compounds will be compared using a two-sample t -test and/or a confidence interval for the difference in means for two independent samples.

Part (b):

Each participant will be randomly assigned to a bin as described in part (a). The researchers will distribute two identical tubes, one labeled 1 and the other labeled 2, to each participant. One of those tubes will contain the new compound and the other will contain the current compound. Neither the researchers nor the participants will know which compound is in which tube. Only the analyst will have this information. Each participant will apply one compound to one arm and the other compound to the other arm. The assignment of the compounds to the arms is completed using randomization. A random number will be generated for each participant, and the participants with the 50 smallest random numbers will apply tube 1 to their right arm, and the remaining 50 participants will apply tube 2 to their left arm. Each participant will insert both arms into the assigned bin at the same time for one minute, and the number of mosquito bites will be counted on each arm. The analyst will compute the difference in the number of bites (new – current) for each of the 100 participants and use a one-sample t -test and/or construct a confidence interval for the mean of the differences to test the null hypothesis that the mean difference is zero.

Part (c):

The matched-pairs design in part (b) is better because one potential source of variation, person-to-person variability in susceptibility to mosquito bites, is controlled.

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Question 3 (continued)

Scoring

Part (a) is divided into two subparts. Each subpart is scored as essentially correct (E), partially correct (P), or incorrect (I). Parts (b) and (c) are scored as essentially correct (E), partially correct (P), or incorrect (I).

Part (a) contains two parts. The first part (a1) deals with the description of a completely randomized design (CRD). The second part (a2) deals with the inference procedure.

Part (a1) is essentially correct (E) if the student:

- Describes a completely randomized design (CRD) that indicates that participants are assigned to two treatment groups corresponding to the new and current compounds; AND
- Correctly describes an appropriate randomization procedure for assigning participants to treatment groups.

Part (a1) is partially correct (P) if the explanation of the randomization procedure is not clear or is incomplete OR the student fails to address the assignment of participants to treatment groups.

Part (a1) is incorrect (I) if the student describes a design that is not based on random assignment. For example, if a design allows the subjects to self-select into two groups. A matched-pairs design is also scored as incorrect.

Part (a2) is essentially correct (E) if the student:

- Chooses a two-sample t -test or a two-sample confidence interval for the difference in means; AND
- Indicates that the mean number of mosquito bites will be compared for the two compounds.

Part (a2) is partially correct (P) if only one of the above is included.

Part (a2) is incorrect (I) if none of the above is included.

Part (b) is essentially correct (E) if the student describes a matched-pairs experiment that:

- Identifies the participants as the blocks; AND
- Describes a method for randomly assigning the treatments within each block (for designs in which the two treatments are not applied at the same time, the order in which the treatments are given must also be properly randomized); AND
- Correctly identifies an appropriate inference procedure based on the observed differences in mosquito bites within each block.

Part (b) is partially correct (P) if the student does any of the following:

- Provides a correct inference procedure, but
 - Uses gender or some other characteristic to form the pairs;
 - Attempts to describe the random assignment within each block, but the explanation of the random assignment is not clear or incomplete;
 - Neglects to indicate that the analysis will be based on the differences within each block; OR
- Describes a correct randomization process but does not provide a correct inference procedure.

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Question 3 (continued)

Part (b) is incorrect (I) if the student describes any design not based on random assignment within the blocks (e.g., allows the subjects to self-select which compound is applied to which arm) or just refers to “random assignment” but does not describe the method of assignment.

Notes for part (b):

Examples of alternative matched-pairs designs that will be scored as essentially correct:

1. If the student assumes that only one arm can be inserted into a bin, the experiment can be done by randomly selecting 50 of the 100 available participants. The bins are labeled from 1 to 100 and two bins are randomly assigned to each subject, one for each arm. This can be done by using a random number generator to assign each participant a unique random number and sorting the list of participants with respect to those numbers. Bins 1 and 2 are assigned to the first participant on the list, bins 3 and 4 are assigned to the second participant on the list, and so on. For each subject, a coin is tossed to determine which bin is assigned to which arm. Then, the experiment proceeds as described above. Another coin will be tossed to decide which arm receives the new compound. The current compound is applied to the other arm. Either both arms will be tested at the same time or another coin will be tossed to determine which arm is tested first.
2. In this design, each participant uses one bin twice. One bin is randomly assigned to each of the 100 participants as described above. Each participant will apply one compound to one arm and the other compound to the other arm. A coin can be tossed to decide which arm receives the new compound. The current compound is applied to the other arm. The coin can be tossed a second time to determine which arm is put into the bin first. A potential disadvantage of this experiment is that the mosquitoes that are most aggressive and most resistant to the compounds will be more likely to bite the first arm inserted into a bin and less likely to bite the second arm. Randomizing the order in which the arms are inserted into the bin controls potential bias of this order effect, but the variability of the observed differences may be substantially larger than for the two other matched-pairs designs that were previously described, and this would make the comparison of the effects of the compounds less precise.

Part (c) is essentially correct (E) if the matched-pairs design is chosen over a CRD based on rationale that the blocking factor will reduce person-to-person variability in susceptibility to mosquito bites.

Part (c) is partially correct (P) if the student:

- Chooses the CRD over an incorrect matched-pairs design with appropriate rationale; OR
- Chooses a matched-pairs design over a CRD, with weak rationale.

Part (c) is incorrect (I) if the student:

- Makes a choice with no justification or a severely flawed argument; OR
- Chooses the matched-pairs design because the sample size is larger; OR
- Chooses the CRD with the justification that a CRD is always better than a matched-pairs design; OR
- Chooses the matched-pairs design with the justification that a matched-pairs design is always better than a CRD.

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Question 3 (continued)

Each essentially correct (E) response counts as 1 point, each partially correct (P) response counts as $\frac{1}{2}$ point.

- 4 Complete Response**
- 3 Substantial Response**
- 2 Developing Response**
- 1 Minimal Response**

Note: If a response is in between two scores (for example, $2\frac{1}{2}$ points), use a holistic approach to determine whether to score up or down depending on the strength of the response and communication.

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Question 4

Solution

Part (a):

Step 1: Identify appropriate confidence interval by name or by formula.

One sample confidence interval for a mean (of the differences)

$$OR \quad \bar{x}_d \pm t_{n-1}^* \frac{s_d}{\sqrt{n}}$$

Step 2: Check appropriate conditions.

Assume the population of differences in growth is normally distributed. The information provided in the stem of the problem suggests that this condition is met. Because the 24 seeds were randomly chosen and randomly assigned to the containers, the differences are independent.

Step 3: Correct mechanics.

The 95% confidence interval for the mean difference in growth is

$$-2.015 \pm 2.201 \frac{1.163}{\sqrt{12}} = -2.015 \pm (2.201)(0.336) = -2.015 \pm 0.7389$$

or (-2.7539, -1.2761).

Step 4: Interpret the confidence interval in context.

We are 95% confident that the mean difference in the growth of the untreated and treated seeds is between -2.7539 and -1.2761.

Part (b):

Step 1: Identify a correct pair of hypotheses.

$H_0 : \mu_d = 0$ versus $H_a : \mu_d \neq 0$, where μ_d is the mean difference in the untreated and treated seeds.

Step 2: State the correct conclusion in context.

Since the 95% confidence interval does not include zero, the null hypothesis can be rejected at the $\alpha = 0.05$ significance level. In other words, we have statistically significant evidence at the $\alpha = 0.05$ level that there is a mean difference in the growth of untreated and treated seeds.

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Question 4 (continued)

Scoring

Each part is scored as essentially correct (E), partially correct (P), or incorrect (I).

Part (a) is essentially correct (E) if all three of steps 1, 3, and 4 of the confidence interval solution are correct.

Part (a) is partially correct (P) if two of the three steps are correct.

Part (a) is incorrect (I) if only one of the steps is correct.

Notes:

1. Step 2 may be omitted since this information is provided in the stem.
2. In step 3, other confidence levels may be used, e.g.,
 - 90% C.I. is $-2.015 \pm 1.796 \frac{1.163}{\sqrt{12}} = -2.015 \pm 0.6030$ or $(-2.618, -1.412)$
 - 99 % C.I. is $-2.015 \pm 3.106 \frac{1.163}{\sqrt{12}} = -2.015 \pm 1.0428$ or $(-3.0578, -.9722)$
3. In step 4, a correct interpretation of the confidence level cannot substitute for a correct interpretation of the confidence interval in context.
4. If a two-sample procedure is used, the highest possible score is (P). The 95% confidence interval for the difference in the two means is $(\bar{x}_1 - \bar{x}_2) \pm t_{\min\{n_1-1, n_2-1\}}^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} =$
 $(15.989 - 18.004) \pm 2.201 \sqrt{\frac{(1.098)^2}{12} + \frac{(1.175)^2}{12}} = -2.015 \pm 1.0218$ or $(-3.037, -0.993)$.
5. The incorrect two-sample confidence intervals from the calculator are:
 - 95% C.I. is $(-2.978, -1.052)$
 - 99% C.I. is $(-3.324, -0.706)$

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Question 4 (continued)

Part (b) is essentially correct (E) if the correct conclusion is stated in context and justified using the confidence interval constructed in part (a). Statements of the null and alternative hypotheses are not required.

Part (b) is partially correct (P) if the student:

- Does not provide a conclusion in the context of the problem; OR
- Provides a conclusion in the context of the problem but the justification is weak; OR
- Uses a completely correct application of an appropriate hypothesis test to justify a correct conclusion but does not refer to the confidence interval in part (a).

Part (c) is incorrect (I) if the student:

- Provides a conclusion that is inconsistent with the interval provided in part (a); OR
- Provides a correct conclusion with no justification; OR
- Ignores the confidence interval in part (a) and fails to correctly conduct an appropriate hypothesis test to justify a conclusion.

Note: If the student uses a two-sample confidence interval or some other incorrect confidence interval in part (a), the solution will be scored relative to the reported interval. The student will not be penalized in part (b) for an incorrect solution to part (a).

4 Complete Response (EE)

Both parts are essentially correct

3 Substantial Response (EP or PE)

One part essentially correct and the other part partially correct

2 Developing Response (EI, IE, or PP)

One part essentially correct and the other part incorrect
OR
Both parts partially correct

1 Minimal Response (PI or IP)

One part is partially correct

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Question 5

Solution

Part (a):

$$\text{Predicted Pulse} = 63.457 + 16.2809 (\text{Speed})$$

Part (b):

The intercept (63.457 bpm) provides an estimate for John's mean resting pulse (walking at a speed of zero mph).

The slope (16.2809 bpm/mph) provides an estimate for the mean increase in John's heart rate as his speed is increased by one mile per hour.

Part (c):

The margin of error for the confidence interval for the slope parameter is $t_{n-2}^* \times s_b$, where s_b is the standard error of the slope parameter. For a 98% confidence interval, the margin of error is $3.365 \times 0.8192 = 2.7566$ bpm.

Scoring

Part (a) is scored as essentially correct (E) or incorrect (I). Parts (b) and (c) are scored as essentially correct (E), partially correct (P), or incorrect (I).

Note: If the student uses X and Y , then both variables must be identified.

Part (b): There are four steps to constructing correct interpretations:

- Step 1: A correct mathematical interpretation of the reported slope (16.2809) as a rate of increase in heart rate as walking speed increases.
- Step 2: A correct mathematical interpretation of the reported intercept as a pulse rate when walking speed is zero.
- Step 3: Correct use of units of measurement, e.g., John's heart rate increases 16.2809 bpm as his speed is increased by one mile per hour.
- Step 4: Interpretation of the reported values as estimates of the corresponding mean quantities.

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Question 5 (continued)

Part (b) is essentially correct (E) if all four steps are correct.

Part (b) is partially correct (P) if two or three steps are correctly addressed. Step 2 is scored as incorrect, for example, if the student suggests that the intercept does not have a meaningful interpretation.

Part (b) is incorrect (I) if at most one step is correct.

Note: The student is only penalized once for switching the variables.

Part (c) is essentially correct (E) if the standard error of the slope is identified and the correct critical value is used to calculate the margin of error.

Part (c) is partially correct (P) if the student:

- Computes the 98% confidence interval but does not identify the margin of error; OR
- Recognizes that the margin of error consists of the standard error of the coefficient and the critical value but uses an incorrect value for one of the two components or uses a t -value with 6 degrees of freedom and an incorrect standard error.

Part (c) is incorrect (I) if the student uses:

- The standard error of the coefficient as the margin of error; OR
- A critical value as the margin of error.

4 Complete Response (3E)

All three parts essentially correct

3 Substantial Response (2E 1P)

Two parts essentially correct and one part partially correct

2 Developing Response (2E 0P or 1E 2P)

Two parts essentially correct and zero parts partially correct
 OR
 One part essentially correct and two parts partially correct

1 Minimal Response (1E 1P or 1E 0P or 0E 2P)

One part essentially correct and either zero parts or one part partially correct
 OR
 Zero parts essentially correct and two parts partially correct

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Question 6

Solution

Part (a):

Step 1: State a correct pair of hypotheses.

$$H_0 : \mu = 128 \text{ fluid ounces versus } H_a : \mu < 128 \text{ fluid ounces}$$

Step 2: Identify a correct test (by name or by formula) and checks appropriate conditions.

One sample t -test for a mean

$$\text{OR } t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

Condition: The random sample is taken from a normal population. (This information is stated in the stem so it does not need to be repeated here.)

Step 3: Use correct mechanics, including the value of the test statistic, degrees of freedom, and p -value (or rejection region)

$$\text{Test Statistic: } t = \frac{127.2 - 128}{2.1/\sqrt{12}} = \frac{-0.8}{0.6062} = -1.3192$$

$$p\text{-value: } P(T_{11d.f.} < -1.3192) = 0.1070$$

Step 4: Using the result of the statistical test, state a correct conclusion in the context of the problem.

Since the p -value = 0.1070 is greater than any reasonable significance level, say $\alpha = .05$, we do not have statistically significant evidence to refute the claim that the company is in compliance with the regulations. That is, we cannot reject the null hypothesis that the mean quantity of milk in 12 containers is at least 128 fluid ounces.

If both an α and a p -value are given, the linkage is implied. If no α is given, the solution must be explicit about the linkage by giving a correct interpretation of the p -value or explaining how the conclusion follows from the p -value.

If the p -value in step 3 is incorrect but the conclusion is consistent with the computed p -value, step 4 can be considered as correct.

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Question 6 (continued)

Part (b)

Let X denote the amount of fluid in a randomly selected container from this group. The probability that a randomly selected container from this group contains at least 125 fluid ounces is:

$$P(X \geq 125) = P\left(Z \geq \frac{125 - 128}{2}\right) = P(Z \geq -1.5) = 1 - 0.0668 = 0.9332$$

Part (c):

Let $X_{(1)} = \min\{X_1, X_2, \dots, X_{12}\}$. The probability that the smallest amount of milk recorded in the 12 randomly selected containers will be at least 125 fluid ounces is:

$$\begin{aligned} P(X_{(1)} \geq 125) &= P(X_1 \geq 125, X_2 \geq 125, \dots, X_{12} \geq 125) \\ &= [P(X_1 \geq 125)]^{12} \\ &= (0.9332)^{12} \\ &= 0.4362 \end{aligned}$$

Part (d):

Looking at the sorted list of 150 minimums, we notice that 66 of the minimums are at least 125 and 84 of the minimums are less than 125. Thus, the probability in part (c) is approximated by

$P(X_{(1)} \geq 125) \approx \frac{66}{150} = 0.44$ or $P(X_{(1)} \geq 125) \approx 1 - \frac{84}{150} = 0.44$. The difference between the simulated value and the theoretical value, $0.44 - 0.4362 = 0.0038$, is very small. In other words, the simulation provides a very good approximation to the theoretical value.

Scoring

Each part is scored as essentially correct (E), partially correct (P), or incorrect (I).

Part (a) is essentially correct (E) if all four of the steps are correct. Each step is scored as correct or incorrect, no partial credit is given for the steps.

Part (a) is partially correct (P) if two or three steps are correct.

Part (a) is incorrect (I) if at most one step is correct.

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Question 6 (continued)

Part (b) is essentially correct (E) if the student provides:

- The correct probability; AND
- An algebraic or graphical justification, with the exception of minor arithmetic or transcription errors.

Part (b) is partially correct (P) if the student only provides one of the two items above.

Part (b) is incorrect (I) if the student provides a probability other than 0.9332 with no justification.

Part (c) is essentially correct (E) if the student provides:

- The correct probability; AND
- An algebraic justification, with the exception of minor arithmetic or transcription errors.

Part (c) is partially correct (P) if the student only provides one of the two items above.

Part (c) is incorrect (I) if the student provides a probability other than 0.4632 with no justification.

Note: The student will only be penalized once if they correctly use an incorrect probability from part (b) in the calculations for part (c).

Part (d) is essentially correct (E) if the student provides a:

- Correct estimate based on the simulation results; AND
- Valid comparison of the theoretical and simulated values.

Part (d) is partially correct (P) if the student provides:

- Only one of the two items above; OR
- An estimate of $\frac{65}{150} = 0.4333$; OR
- An estimate of $\frac{85}{150} = 0.5667$; OR
- An estimate of $\frac{84}{150} = 0.56$.

Notes:

1. If a student is unable to solve part (c), the student may assume the value is equal to some number and then make a comparison between this number and the estimate from the simulation to earn an essentially correct response. That is, the student will not be penalized twice for not being able to calculate the theoretical value.
2. The remarks in the comparison should be consistent with the two values provided by the student, even if these values are incorrect.

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Question 6 (continued)

Each essentially correct (E) response counts as 1 point, each partially correct (P) response counts as $\frac{1}{2}$ point.

- 4 Complete Response**
- 3 Substantial Response**
- 2 Developing Response**
- 1 Minimal Response**

Note: If a response is in between two scores (for example, 2 $\frac{1}{2}$ points), use a holistic approach to determine whether to score up or down depending on the strength of the response and communication.