



PROJECT-SET

Statistics Education for Teachers

Open-Ended Task: Mira Beach #1

Grading Rubric

Task adopted from www.illustrativemathematics.org aligned with standard S-IC

Written task aligned with SV: Loop 2

Grade each question below using the following three grades: Essentially Correct (E), Partially Correct (P), and Incorrect (I).

Example answers for each category are given below each question.

Once each of the questions is graded in this manner, the results will then be tallied to give an overall score for the task. For each E, a person will receive 1 point. For each P, a person will receive $\frac{1}{2}$ point. For each I, a person will receive 0 points. The overall grade will be one of the following:

4 Complete Response

3/3.5 Substantial Response

2/2.5 Developing Response

1/1.5 Minimal Response

When grading, please write the amount of points earned, the word to describe the points earned (complete, substantial, developing, or minimal) on the front page of each person's paper.

In the town of Mira Beach, Florida the city council has taken a census of their population to get information about the city. The Town Census dataset contains information about every person in the population of Mira Beach. There are 1400 people that live in Mira Beach. The dataset contains information on the age, gender, race, marital status, school attendance, public or private school, and income of the residents of Mira Beach.

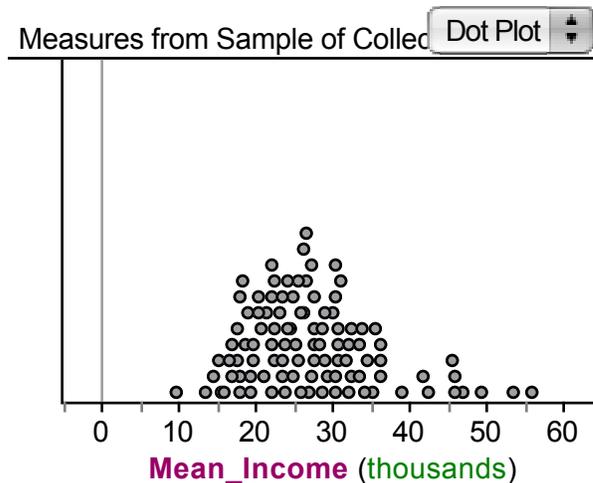
*For the following two questions, you may save and provide software output for your answer or handwrite the answers in the space below each question.

1. Using these data, randomly sample 30 people 100 times. For each sample find the average income. Use the table below to record the average incomes.

| Grading Category | Solutions, Explanations, and Sample Answers |
|-------------------------|---|
| Essentially Correct (E) | An essentially correct answer would present a table of 100 entries reporting the average income per sample or show a Fathom output with the same information. |
| Partially Correct (P) | A partially correct answer would give either incorrect information on 100 samples or give the correct information on less than 100 samples. |
| Incorrect (I) | An incorrect answer would fail to meet the criteria of E and P. |

2. Construct an approximation to the sampling distribution for the average income in the town of Mira Beach.

| Grading Category | Solutions, Explanations, and Sample Answers |
|-------------------------|---|
| Essentially Correct (E) | An essentially correct answer would present a graphical display displaying the values found in (1) and how frequently those values each occurred (i.e., it would display a distribution). |
| Partially Correct (P) | A partially correct answer would a graphical display that does not show the values or their frequencies. |
| Incorrect (I) | An incorrect answer would fail to meet the criteria of E and P. |



3. What is an implausible value for the average income of people in Mira Beach? Justify your answer referring to your results from questions 1 & 2.

An implausible value for the average income of people in Mira Beach is 100K. This value is very far beyond any of the values pictured in the dotplot.

4. a) What is a plausible value for the average income of people in Mira Beach? Justify your response, referring to your results from questions 1 & 2.

A plausible outcome for the average income of people in Mira Beach would be 28,000. The center of the data appears to be somewhere between 22K to 30K. The distribution has the shape of a large

mound between those values with a few values trickling past 35K. The mean incomes are spread out with some average incomes coming in as high as 55K or 56K. These may be outliers. In general, however, the data are pretty concentrated in the large mound between 20-30K.

b) If possible, give one other plausible value for the average income of people in Mira Beach and justify your response based on your results from questions 1 & 2. If it is not possible, explain why.

Another plausible outcome could be 25,000. As explained in the previous question, the average values of income seem to be concentrated between 22-30K. Thus, really any of those values may be plausible.

| Grading Category | Solutions, Explanations, and Sample Answers |
|-------------------------|--|
| Essentially Correct (E) | Answers to these questions will vary depending on the samples in (1). An essentially correct answer would present a valid argument referring to the sampling distribution from the previous question. For example, someone may note the mean of the sampling distribution and make the case that it is a plausible outcome with reference to the spread and shape of the distribution. Note that the measure of center chosen should reflect the distribution. |
| Partially Correct (P) | A partially correct answer would have only either (a) or (b) correct. A partially correct answer would give a value without any explanation. |
| Incorrect (I) | An incorrect answer would fail to meet the criteria of E and P. |

As part of a marketing campaign and among other standard pieces of information, the city council would like to know whether the students in the town consider their parents to be “strict.” They do not have time to collect this extra information from all the students in the town, so each city council member plans to obtain data from a sample of 30 students.

5a. Describe the parameter of interest and a statistic the city council could use to estimate the parameter in this scenario.

The parameter of interest is the proportion of students in the town that consider their parents to be strict. To estimate this parameter, the city council will use the sample proportion of students. The statistic is the proportion of students in the sample that consider their parents to be strict.

5b. The city council quickly realizes that, as there is no definition of “strict”, they could not simply ask a student, “Are your parents or guardians strict?” Write a question that could provide objective data to answer their question.

In order to gauge whether students believed their parents to be strict, we must formulate an objective questions that gets at the opinion about strictness of the students. Some questions that would work are:

- 1. Do you think your curfew is too early?**
- 2. Do you feel like there are social things you want to do that your parents will not allow you to do?**

| Grading Category | Solutions, Explanations, and Sample Answers |
|-------------------------|--|
| Essentially Correct (E) | <p>The parameter of interests is the proportion of students in the town that thought their parents were strict. The parameter the students could use is the sample proportion. Some objective questions that may relate to strictness and be able to gather good data would be:</p> <ol style="list-style-type: none"> 1. Do you think your curfew is too early? 2. Do you feel like there are social things you want to do that your parents will not allow you to do? |
| Partially Correct (P) | <p>A partially correct answer would not get all parts of the question correct. Instead, they would only reply to one part correct.</p> <p>Sample Answer: The parameter of interest is the proportion of strict parents. Some objective questions that may relate to strictness and be able to gather good data would be:</p> <ol style="list-style-type: none"> 1. Do you think your curfew is too early? 2. Do you feel like there are social things you want to do that your parents will not allow you to do? |
| Incorrect (I) | An incorrect answer would fail to meet the criteria of E and P. |