

PISc 724 Homework #1

Answer the following questions adapted from the text: Principals and Procedures of Statistics - A Biometrical Approach: 3rd Edition. 1997. R.G.D. Steel, J.H. Torrie, and D.A. Dickey.

To facilitate grading of assignments, please write on only one side of the page.

1. Classify the following variables as qualitative or quantitative-discrete or quantitative-continuous: eye color, insect counts, number of errors per pupil in a spelling test, tire-miles to first puncture, possible yield of corn from a given field, number of children born in the nearest hospital on New Year's Day, possible number of heads from tossing 50 coins, number of fish in a pond.
2. In 10 tosses of seven coins, the numbers of heads were 2, 6, 2, 2, 5, 3, 5, 3, 3, 4. If the observations are denoted by Y_1, Y_2, \dots, Y_n :
 - a. What is the value of n ?
 - b. What is the value of Y_2 ?
 - c. What is the value of Y_7 ?
 - d. For what values of i does $Y = 2$? 3? 4?
 - e. Distinguish between Y_{i-1} and $Y_i - 1$.
 - f. What do Y_{i-1} and $Y_i - 1$ equal for $i = 2$?
 - g. Write the observations as a vector.
3. A certain instructor asked the girls in his class to estimate his weight. Their responses were 190, 230, 105, 180, 130, 160, and 170 pounds.
 - a. Compute the sample mean.
 - b. What is the sample median?
4. The boys in the class of question 3 estimated their instructor's weight as 150, 195, 175, 147, 175, 170, 195, 170, and 190 pounds.
 - a. Compute the sample mean.
 - b. What is the sample median?
5. Suppose we are given $\bar{Y}_1 = 37$, $\bar{Y}_2 = 41$, and $\bar{Y}_3 = 28$ based on 50, 20, and 10 observations, respectively. If you are required to choose a single mean as best, what is your choice and why?
6. Using the information provided in question 5, answer the following questions:
 - a. Compute the weighted mean of these means using weights equal to the sample sizes.
 - b. What were the three original sample totals?
 - c. How would you use these to find the arithmetic mean of all 80 observations?
 - d. Is this the same process as finding the weighted mean with weights equal to sample sizes?

7. One method of sampling fish in a lake is to kill them all by the use of rotenone, collect them in buckets, and then take a random sample of buckets. In one such experiment, a random sample of two buckets out of 20 was taken and all fish in each bucket were measured for length in inches. The data were as follows:

Sample A: 5 fish of 5 inches, 19 of 6 inches, 19 of 7 inches, 8 of 8 inches, and 3 of 9 inches; $n=54$

Sample B: 10 fish of 5 inches, 27 of 6 inches, 15 of 7 inches, 6 of 8 inches, and 3 of 9 inches; $n=61$

For each sample answer the following questions:

- Compute the mean.
 - Did you compute the mean using 54 (61) individual observations or as a weighted mean?
 - How many distinct values of the variable are used when computing the mean?
 - Use the two sample means to compute the weighted mean.
 - Why did you choose the weights you used?
 - Is your weighted mean the same as the arithmetic mean of all 115 lengths?
8. Using the data from question 3:
- Compute s^2
 - Compute s .
 - Compute the range.
 - Compute $s_{\bar{y}}^2$
 - Compute $s_{\bar{y}}$
9. Using the data from question 4:
- Compute s^2
 - Compute s .
 - Compute the range.
 - Compute $s_{\bar{y}}^2$
 - Compute $s_{\bar{y}}$
10. Given Y_1 and Y_2 are random variables with $E(Y_1) = 10$, $E(Y_2) = 2$, $\sigma_{Y_1}^2 = 9$ and $\sigma_{Y_2}^2 = 4$.
- Calculate $E(4Y_1 - 2Y_2 + 6)$
 - Calculate $V(4Y_1 - 2Y_2 + 6)$