Quiz #5: Solutions

Milica Cudina

2021-09-25

Problem 1. (3 points)

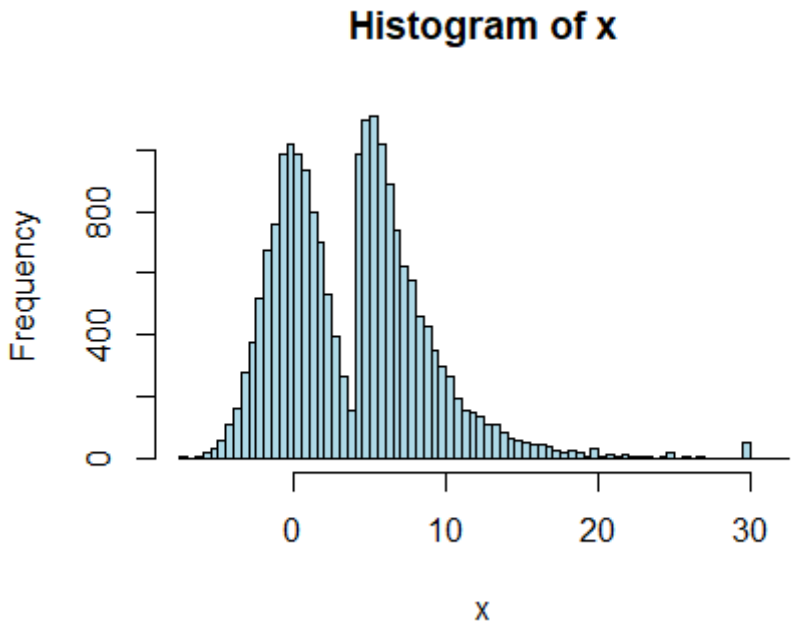
Please, provide an example from real life (including what you may have read in the press) of **sampling bias** due to *voluntary response.*

Solution: Responses will vary.

Problem 2. (2 points)

Consider the following histogram:

```
knitr::include_graphics("hist.png")
```



The histogram is . . .

a. unimodal.

b. bimodal, symmetric.
c. bimodal, asymmetric.
d. trimodal.
e. uniform.

Why?

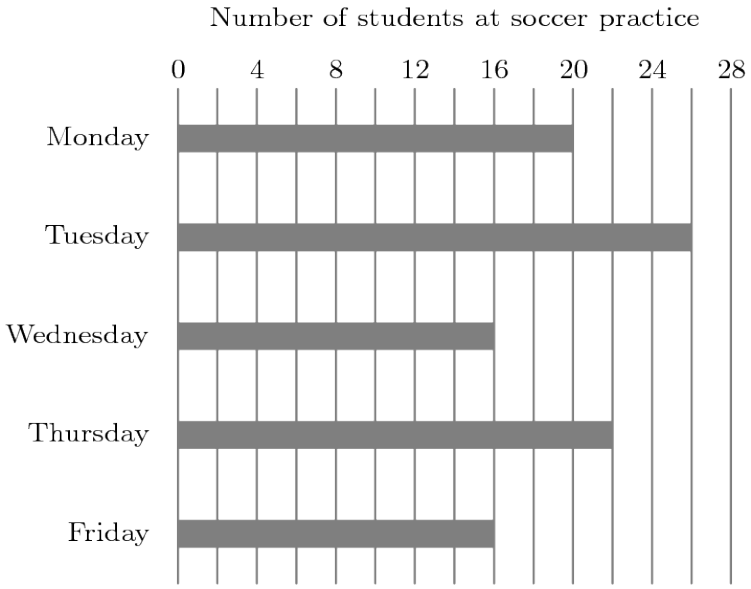
Solution: The correct answer is **c.** There are two modes at around 0 and at around 8. There is a long tail on the right-hand side (notice the observations at around 30) while there is not a long tail on the left-hand side.

Problem 3. (5 points)

Source: AMC8, 2019.

The diagram shows the number of students at soccer practice each weekday during last week. After computing the mean and median values, Coach discovers that there were actually 21 participants on Wednesday.

```
knitr::include_graphics("amc-8.png")
```



Which of the following statements describes the change in the mean and median after the correction is made? *Why?*

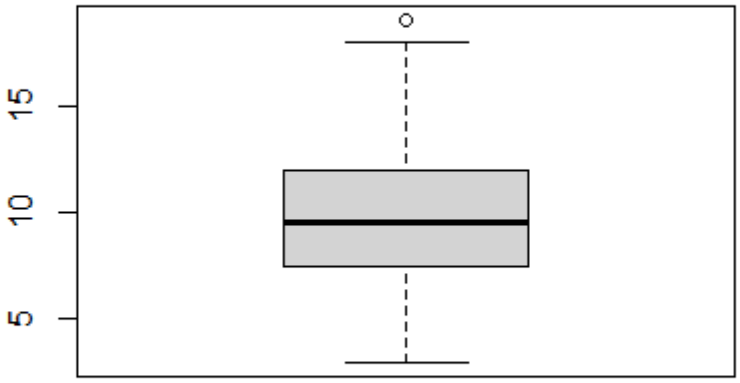
a. The mean increases by 1 and the median does not change.
b. The mean increases by 1 and the median increases by 1.
c. The mean increases by 1 and the median increases by 5.
d. The mean increases by 5 and the median increases by 1.
e. The mean increases by 5 and the median increases by 5.

Solution: The correct answers is **b.** The sum of the number of students increased by 5 with the correction (from 16 to 21 on Wednesday. So the average increased by $5/5 = 1$. As for the median, the old data set was $16, 16, 20, 22, 26$ and the median was 20. Now, the data set is, in increasing order: $16, 20, 21, 22, 26$. So, the new median is 21; an increase of 1.

Problem 4. (5 points)

Consider the following box plot:

```
knitr::include_graphics("boxplot.png")
```



Which summary statistics does it correspond to?

a.

Min.	Q1	Median	Mean	Q3	Max.
3.00	7.75	9.50	9.95	12.00	19.00

b.

Min.	Q1	Median	Mean	Q3	Max.
3.00	7.75	9.50	9.95	12.00	17.00

c.

Min.	Q1	Median	Mean	Q3	Max.
0.00	7.75	8.00	9.95	12.00	17.00

d.

Min.	Q1	Median	Mean	Q3	Max.
3.00	7.75	9.50	9.95	10.00	17.00

e. None of the above.

Solution: The correct answer is **a.**