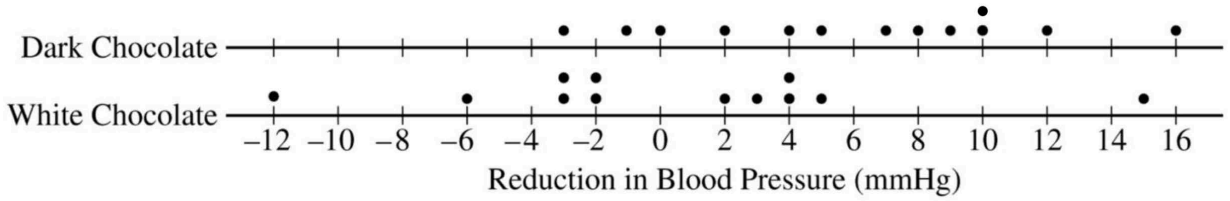
2023 AP Daily: Practice Sessions

AP Statistics

Session 4 – FRQ (Part A: Multi-Focus)



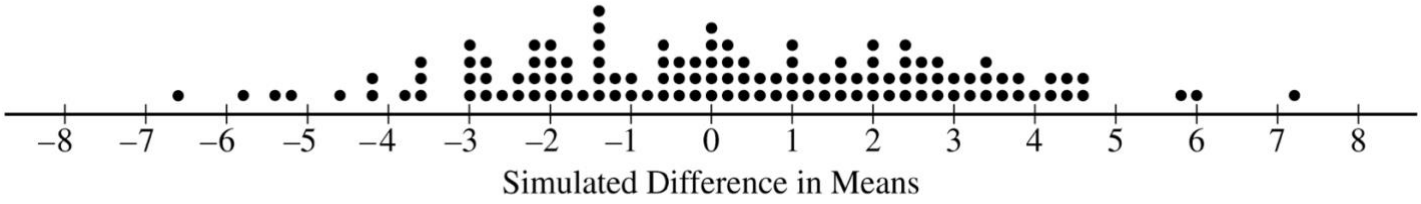
1. Studies have shown that foods rich in compounds known as flavonoids help lower blood pressure. Researchers conducted a study to investigate whether there was a greater reduction in blood pressure for people who consumed dark chocolate, which contains flavonoids, than people who consumed white chocolate, which does not contain flavonoids. Twenty-five healthy adults agreed to participate in the study and add 3.5 ounces of chocolate to their daily diets. Of the 25 participants, 13 were randomly assigned to the dark chocolate group and the rest were assigned to the white chocolate group. All participants had their blood pressure recorded, in millimeters of mercury (mmHg), before adding chocolate to their daily diets and again 30 days after adding chocolate to their daily diets.

   The reduction in blood pressure (before minus after) for each of the participants in the two groups is shown in the dotplots above.

   a. Determine and compare the medians of the reduction in blood pressure for the two groups.

   The researchers found the mean reduction in blood pressure for those who consumed dark chocolate is $\bar{x}_{dark}$= 6.08 mmHg and the mean reduction in blood pressure for those who consumed white chocolate is $\bar{x}_{white}$ = 0.42 mmHg.

   b. One researcher indicated that because the difference in sample means of 5.66 mmHg is greater than 0 there is convincing statistical evidence to conclude that the population mean blood pressure reduction for those who consume dark chocolate is greater than for those who consume white chocolate. Why might the researcher's conclusion, based only on the difference in sample means of 5.66 mmHg, not necessarily be true?



A simulation was conducted to investigate whether there is a greater reduction of blood pressure for those who consume dark chocolate than for those who consume white chocolate. The simulation was conducted under the assumption that no difference exists. The results of 120 trials of the simulation are shown in the above dotplot.

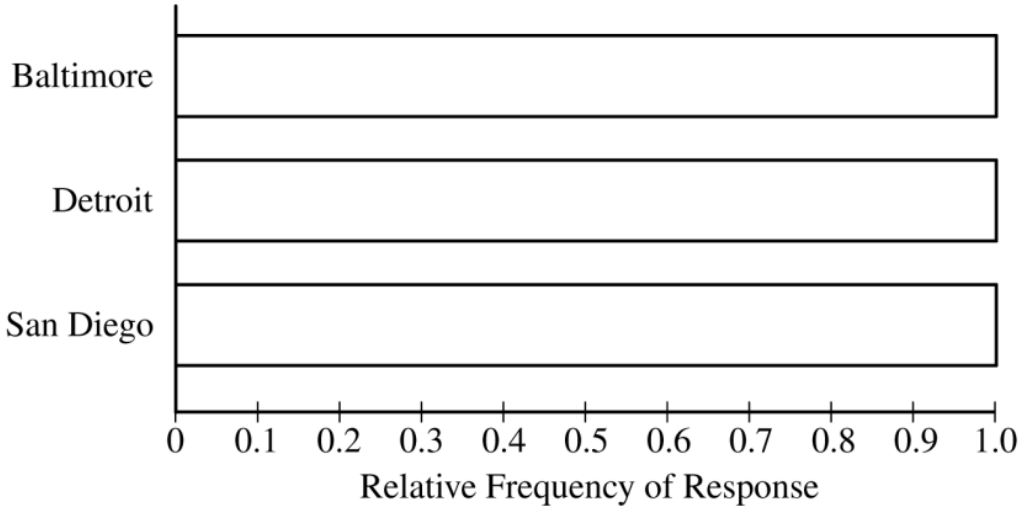
c. Use the results of the simulation to determine whether the results from the 25 participants in the study provide convincing statistical evidence, at a 5 percent level of significance, that adding dark chocolate to a daily diet will result in a greater reduction in blood pressure, on average, than adding white chocolate to a daily diet. Justify your answer.

	Baltimore	Detroit	San Diego	Total
Yes	727	1,232	1,482	3,441
No	177	431	798	1,406
Total	904	1,663	2,280	4,847

2. A research center conducted a national survey about teenage behavior. Teens were asked whether they had consumed a soft drink in the past week. The above table shows the counts for three independent random samples from major cities.

   a. Suppose one teen is randomly selected from each city's sample. A researcher claims that the likelihood of selecting a teen from Baltimore who consumed a soft drink in the past week is less than the likelihood of selecting a teen from either one of the other cities who consumed a soft drink in the past week because Baltimore has the least number of teens who consumed a soft drink. Is the researcher's claim correct? Explain your answer.

   b. Consider the values in the table.



      i. Construct a segmented bar chart of relative frequencies based on the information in the table.

      ii. Which city had the smallest proportion of teens who consumed a soft drink in the previous week? Determine the value of the proportion.

   c. Consider the inference procedure that is appropriate for investigating whether there is a difference among the three cities in the proportion of all teens who consumed a soft drink in the past week.

      i. Identify the appropriate inference procedure.

      ii. Identify the hypotheses of the test.