Name Key

HW 14-9

In each of the 3 cases below, calculate the "Diff" value as directed, and write a sentence explaining what the "Diff" value means in context. Write the sentence for a general audience.

1. Group A: 8 dieters lost an average of 8 pounds.
   Group B: 8 non-dieters lost an average of 2 pounds over the same time period.
   Calculate and interpret "Diff" = the mean of Group A minus the mean of Group B.

"Diff" = 8 − 2 = 6 lbs.
The 8 dieters lost an avg. of 6 lbs more than the 8 non-dieters.

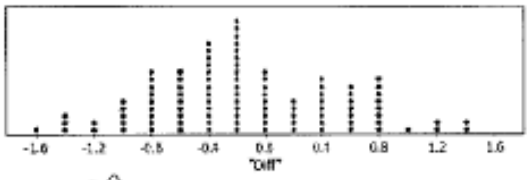
2. Group A: 11 students were on average 0.4 seconds faster in their 100 meter run times after following a new training regimen.
   Group B: 11 students were on average 0.2 seconds slower in their 100 meter run times after not following any new training regimens.
   Calculate and interpret "Diff" = the mean of Group A minus the mean of Group B.

"Diff" = −.4 − .2 = −.6
11 stud. following new training regimen were on avg. .6 sec. faster in their 100m run times than the 11 stud. not following the new training.

3. Group A: 20 squash that have been grown in an irrigated field have an average weight of 1.3 pounds.
   Group B: 20 squash that have been grown in a non-irrigated field have an average weight of 1.2 pounds.
   Calculate and interpret "Diff" = mean of Group A minus the mean of Group B.

"Diff" = 1.3 − 1.2 = .1 lbs.
20 squash grown in an irrigated field have an avg. weight .1 lbs higher than the 20 squash grown in a non-irrigated field.

4. Using the randomization distribution (of 100 values) shown below, what is the probability of obtaining a "Diff" value of -0.6 or less?



$\frac{29}{100} = .29 = 29\%$

5. Would a "Diff" value of -0.6 or less be considered a "statistically significant difference"? Why or why not?

NO -.6 isn't far from 0 and probability of obtaining a "Diff" value of -.6 or less is 29%.

6. Using the randomization distribution shown on the other side, what is the probability of obtaining a "Diff" value of -1.2 or less?

$\frac{6}{100} = .06 = 6\%$

7. Would a "Diff" value of -1.2 or less be considered a "statistically significant difference"? Why or why not?

Yes, possibly. -1.2 is far from 0 and prob. of obtaining a "Diff" value of -1.2 or less is only 6%.

QUIZ

Make-up quizzes in the Test Center.

MORE RULING OUT CHANCE

1. Ayva designed an experiment to determine the effect of a new energy drink on a group of 20 volunteer students. Ten students were randomly selected to form group 1 while the remaining 10 made up group 2. Each student in group 1 drank one energy drink, and each student in group 2 drank one cola drink. Ten minutes later, their times were recorded for reading the same paragraph of a novel. The results of the experiment are shown below.

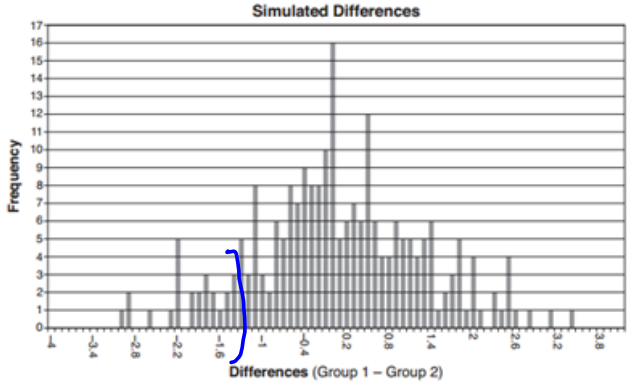
energy drink

Group 1 (seconds)	Group 2 (seconds)
17.4	23.3
18.1	18.8
18.2	22.1
19.6	12.7
18.6	16.9
16.2	24.4
16.1	21.2
15.3	21.2
17.8	16.3
19.7	14.5
Mean = 17.7	Mean = 19.1

cola

Diff = 17.7 − 19.1 = −1.4

Using the given results, Ayva randomly mixes the 20 reading times, splits them into two groups of 10, and simulates the difference of the means 232 times.



$\frac{24}{232} = .103$ ~10.3%

Ayva has decided that the difference in mean reading times is not an unusual occurrence. Support her decision using the results of the simulation. Explain your reasoning.

The diff of −1.4 is not unusual b/c that value or less comes up ~10.3% by chance alone.

2. Jennifer is comparing sample means from two groups of 20 students involved in a controlled experiment. Her sample means have a difference of ~~5.66~~ 5.9. Jennifer uses simulation software to randomly assign the 40 data values from the experiment to two groups and find the difference between their averages. After repeating this process 100 times, the differences between the sample means generated by the simulation software approximated a normal curve with an average difference of 0.4 and a standard deviation of 2.7. Based on the simulation, there was only 1 difference of 5.9 or higher. Is a difference of 5.9 between their averages statistically significant? Justify your answer.

option A

Yes it is ~~stat.~~ sign. b/c ~~of~~ only 1/100 = 1% of the simulation had a diff of 5.9 or high. Therefore, unlikely to have happened by chance.

option B

CI = .4 ± 2(2.7) = (-5, 5.8)

5.9 is outside the C.I. therefore it is stat. sign.

3. It is known that 64% of the people in Kyle's town went to see a movie in the last month. Kyle uses simulation software to generate the results of 100 random samples of 50 people from his town using the known population proportion, 0.64. For simplification purposes, Kyle organizes the sample proportions, rounded to the nearest even hundredth to make the data easier to work with, in a frequency table.

L_1 Sample Proportion	L_2 Frequency
.42	1
.46	1
.52	2
.54	4
.58	6
.60	9
.62	14
.64	13
.66	12
.68	8
.70	11
.72	4
.74	6
.76	3
.78	4
.82	2

a. What are the mean and standard deviation of the sample proportions, to the nearest hundredth?

Stat - Calc - 1Var Stats L_1, L_2

$\bar{x} = .65$

$S_x = .07$

b. Calculate a margin of error to include proportions two standard deviations above and below the mean.

$ME = 2(.07) = .14$

c. Kyle samples 50 people in his town and 73% of them saw a movie in the last month. Could this result happen by chance or did Kyle sample a group that does not represent the population of his town? Justify your answer.

$\hat{p} = .73$

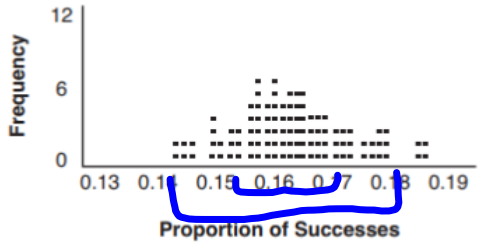
$15/100 = 15\%$ had a mean of .73 or higher.

There is a good chance that this .73 sample came from this population, purely by chance.

or $CI = .65 \pm 2(.07) = (.51, .79)$

Kyle's is inside the CI, ∴ most likely came from this population

4. A study conducted in 2004 in New York City found that 212 out of 1334 participants had hypertension. Kim ran a simulation of 100 studies based on these data. The output of the simulation is shown in the diagram below.



At a 95% confidence level, the proportion of New York City residents with hypertension and the margin of error are closest to

1) proportion ≈ .16; margin of error ≈ .01
2) proportion ≈ .16; margin of error ≈ .02
3) proportion ≈ .01; margin of error ≈ .16
4) proportion ≈ .02; margin of error ≈ .16

Homework -
due Monday