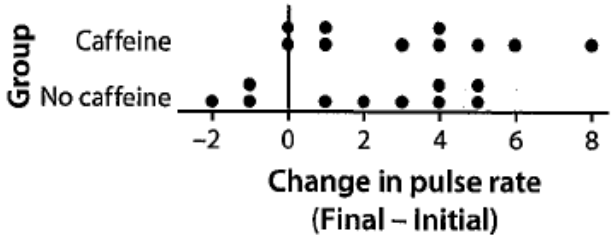
Functions & Trig. Name _____
Two Sample Difference HW

1.) Mr. Luck's class performed a caffeine experiment. All 20 students recorded there pulse rates. Then 10 randomly assigned students consumed a caffeinated drink and recorded an increase or decrease in pulse rate. The other 10 students consumed a non-caffeinated drink and recorded an increase or decrease in pulse rate. The results are shown in the table below.

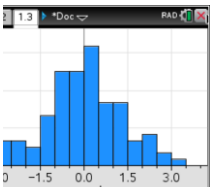
	Change in pulse rate (Final pulse rate – Initial pulse rate)										Mean change
Caffeine	8	3	5	1	4	0	6	1	4	0	3.2
No caffeine	3	–2	4	–1	5	5	1	2	–1	4	2.0



a. Calculate the difference in mean pulse rates for the two groups. (Caffeine – No caffeine)

b. One hundred trials of a simulation were performed to see what differences in means would occur due only to chance variation in the random assignment, assuming that consuming a caffeinated drink or a non-caffeinated drink does not affect pulse rates. Use the results of the simulation to determine if the difference in means from part a, is statistically significant. **Explain your reasoning.**

mean = 0.04
Standard deviation = 1.45

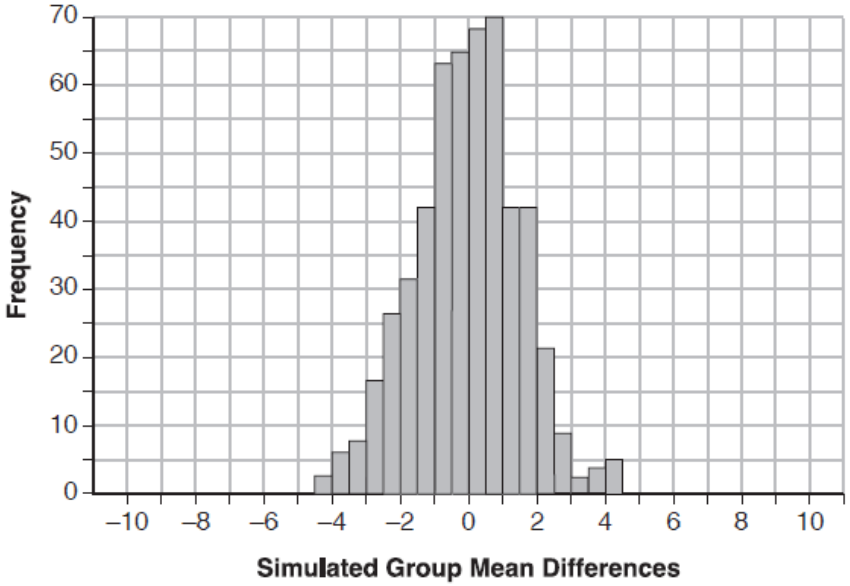


2.) Seventy-two students are randomly divided into two equally-sized groups. Each member of the first group (group 1) is to meet with a tutor after school twice each week for one hour. The second group (group 2) is given an online subscription to a tutorial account that they can access for a maximum of two hours each week. Students in both groups are given the same tests during the year. A summary of the two groups' final grades is shown below:

	Group 1	Group 2
$\bar{x}$	80.16	83.8
S_x	6.9	5.2

Calculate the mean difference in the final grades (group 1 – group 2) and explain its meaning in the context of the problem.

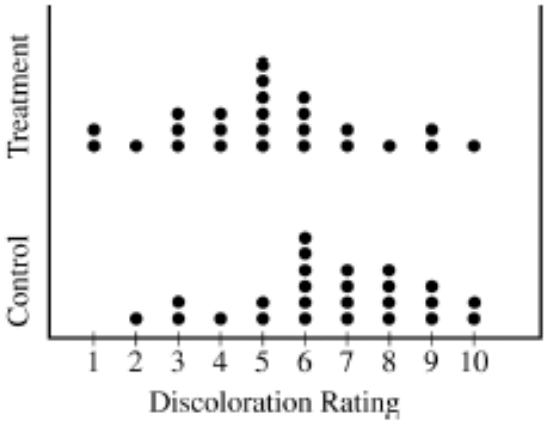
A simulation was conducted in which students' final grades were re-randomized **500 times**.



Use the simulation to determine if there is a significant difference in the final grades. **Explain.**

3.) The department of agriculture at a university was interested in determining whether a preservative was effective in reducing discoloration in frozen strawberries. A sample of 50 ripe strawberries was prepared for freezing. Then the sample was randomly divided into two groups of 25 strawberries each. Each strawberry was placed into a small plastic bag. The 25 bags in the control group were sealed. The preservative was added to the 25 bags containing strawberries in the treatment group, and then those bags were sealed. All bags were stored on $0^{\circ}C$ for a period of 6 months. At the end of this time, after the strawberries were thawed, a technician rated each strawberry's discoloration from 1 to 10, with a low score indicating little discoloration.

The dotplots below show the distributions of discoloration rating for the control and treatment groups.



Researchers at the university decided to calculate a 95% confidence interval for the difference in mean discoloration rating between strawberries that were not treated with preservative and those that were treated with preservative. The 95% confidence interval was (0.16, 2.72).

Is there a significant difference in the population mean discoloration ratings for the treated and untreated strawberries? **Explain.**

4.) Frank, who lives in Texas, and his sister Lilly, who lives in Japan, correspond regularly. From what he can tell from the postmarks on both his and his sister's letters, it appears that it takes longer for Lilly's mail from Japan to reach him in Texas than it does for his letters from Texas to reach her in Japan. When Frank called his post office to ask if there was a reason for this, the postmaster told him that the delivery times of letters in both directions should be the same. Frank and his sister decided to collect data to see if letters from Japan to Texas take longer to be delivered than letters from Texas to Japan. They recorded the delivery time in days.

	N	Mean	StDev	SE Mean
To Texas	12	8.74	2.92	0.84
To Japan	9	6.75	2.56	0.85

95% confidence interval for Texas – Japan: (– 0.53 , 4.51)

Which of the following statements best describes the conclusion that can be drawn from these data?

(A) There is convincing evidence that there is **not a difference** in the mean delivery times.

(B) There is convincing evidence that there is a **difference** in the mean delivery times.

(C) There is convincing evidence that the mean delivery time from Japan to Texas is **greater than** the mean delivery time from Texas to Japan.

(D) There is convincing evidence that the mean delivery time from Japan to Texas is **less than** the mean delivery time from Texas to Japan.