**Body Temperature – Part II**

In an earlier activity, you created a 95% bootstrap confidence interval to explore what the average body temperate is for healthy humans.

In this activity, you are going to test the 19th century claim that the normal human body temperature is 98.6°F (37°C).

**Research Question:** Is the average body temperature for healthy humans 98.6°F (37°C)?

**Discuss the Following Questions**

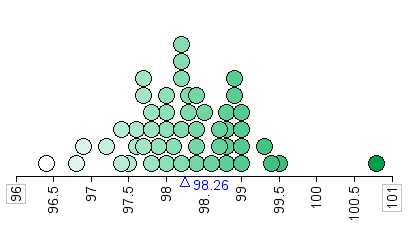
1. What statistical method might you use to help answer this research question?
2. What are the null and alternative hypotheses?

H0:

Ha:

Unlike the ESP study scenario, you can’t use a random device like a coin to simulate randomization samples. Recall that in a testing situation, you simulate samples that are consistent with the null hypothesis; that is, you assume the null hypothesis is true and you simulate samples under that null hypothesis.

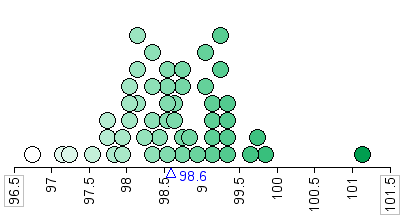
**Original data**



1. Examine the dotplot of the original data above. How much lower is the sample mean of the 50 cases than the null hypothesis parameter value?

If you add the value you reported in question 3 to all of the cases in the original sample, you get a plot like the one below.

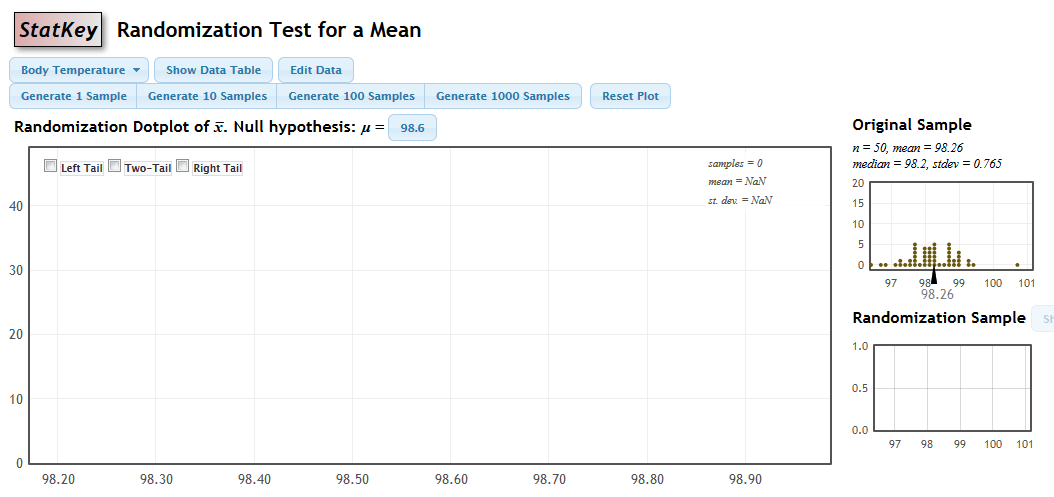
**Original data + Adjusted**



1. By adjusting all of the cases by a particular constant value, does this help to satisfy the requirements needed to simulate a randomization sample? Explain.
2. Provide some instructions on how you might go about creating a single randomization sample from the data. Also include what statistic you will record for that sample.

**CONDUCTING A RANDOMIZATION TEST USING STATKEY**

* Open a web browser and go to <http://lock5stat.com/statkey>.
* Click on the link *Test for Single Mean.*



The data is already preloaded and set on the *Body Temperature* data.

Similar to the bootstrap applet, the dotplot labeled Original Sample on the right-hand side of the screen displays the *Body Temperature* data. It also computes relevant summary statistics of the data. Because this plot and statistics are the original sample data, they will not change when creating bootstrap samples.

The data are comprised of 50 individual’s temperatures, 25 females and 25 males. This sample was obtained via convenience sampling.

1. Report some of the numerical summaries for the *BodyTemp50* data set.

* To get a single randomization sample, click the *Generate 1 Sample* button.

The randomization sample is displayed in the lower right-hand corner of the screen, under the dotplot labeled Randomization Sample. Relevant summary statistics are also computed for the randomization sample.

1. How was this randomization sample obtained? Be as specific as possible.
2. What is the difference between a randomization sample and the original sample?
3. What is the value of the statistic for the single randomization sample?
4. Does everyone in your group (or a neighboring group) have the same randomization statistic? Why does this make sense?

Similar to the bootstrap applet, the randomization statistic is added as a dot to the randomization distribution, the large plot window entitled Randomization Dotplot of Mean.

Continue generating samples until you have at least 10,000 statistics contributing to the randomization distribution.

1. Sketch a plot of the randomization distribution below.
2. Where is the plot centered? Why does this make sense?
3. What does each of the dots in the randomization distribution plot represent? How do these dots compare to the dots in the randomization sample plot?
4. To find the *p*-value, do you want to look at the area in the left tail and/or in the right tail? How do you know?

* Check the box in the upper left-hand corner of the randomization distribution plot next to the appropriate tail.

By default, the area in the tail is set to .025.

1. What cutoff values do you want to look at to find your *p*-value?

* Set your cutoff values to the appropriate number.

1. Find your *p*-value.
2. Provide a description of how the *p*-value is found and how to interpret the *p*-value.
3. Provide an answer to the research question using the value you found in question 16 to provide evidence of statistical significance.
4. Can you generalize these results to all healthy humans? Why or why not?

**EXTENSIONS**

1. What does it mean to be statistically significant?
2. If the significance level was α=.01 instead of .05, would your conclusion be different?

Refer to the interval estimate you constructed in the *Body Temperature – Part I* activity for the following questions.

1. Does that interval contain the hypothesized value of 98.6?
2. How does the bootstrap distribution compare the randomization distribution? Be sure to mention how the bootstrap and randomization samples were simulated and where both distributions are centered.
3. For each method, bootstrap and randomization, what are the assumptions when creating the ‘sampling’ distributions?
4. Do you think you can use confidence intervals to make conclusions in a hypothesis test situation? Why or why not?