

Math 214 Applied Statistics

Laboratory Project #2

Due: Wednesday February 21

Instructions For Projects: Every week or so, you will be required to conduct a statistical experiment on the computer inside or outside the lab and, most importantly, write-up a short report of the results. The report should answer ALL the questions asked and will almost always include some graphics created by R.

Tips for doing Projects: Some simple hints for doing the Lab Projects.

- READ the entire assignment through, including the Thought Questions before doing anything.
- THINK about the 'essay' questions while doing the computer work.
- Write-up the results neatly and clearly. Neat results and presentation will win you respect and praise from friends, neighbors, employers and university professors.

NOTE: You can download your own copy of R for absolutely no charge by going to:
<http://cran.r-project.org/>

Lab Project #2: The Vacation of the Future

1 The Story:

The year is 2020 and interplanetary vacation travel is all the rage. For your upcoming July vacation, you and your friend Bob have looked through the travel brochures and decided upon two possible planets to visit; either PlanetX or PlanetY.

"I don't like it too hot", says Bob as you try to decide, "In fact, I always get very cranky and unreasonable if the temperature is much above 80 degrees."

You look through the brochures and find out that the average temperature of both PlanetX and PlanetY in July is a comfortable 63 degrees. Even better, the very sophisticated brochure for PlanetY indicates that the median temperature there in July is a cool 55 degrees.

"I like PlanetY", says Bob rather emphatically. "We should go there."

You, on the other hand, have taken a statistics class and know a bit about these things. To avoid making a big mistake and vacationing with a hot, cranky and unreasonable Bob, you decide to download data containing daily July temperature readings for the two planets. You are going to make an INFORMED CHOICE based on statistics.

Your Task Using some ideas you've learned about descriptive statistics, make a clear and organized presentation to Bob about why you should NOT go to PlanetY on vacation. Remember, besides being a bit heat sensitive, Bob knows nothing about statistics so you will have to explain things clearly.

2 The Laboratory:

To create 600 samples of temperature data for PlanetX and PlanetY, you will need to access an R function called `SpaceVacation()` in Prof. Poje's directory. Type:

```
> source(file=url("http://www.math.csi.cuny.edu/~poje/R_stuff/SpaceVacation.r"))
```

To create the data and store it in a data frame called `Temps`,

```
> Temps = SpaceVacation()
```

Note, everytime you execute the `SpaceVacation` function, you are actually *creating* new data. Your data will be slightly different than anyone else's data.

To get at the data, `attach` it and see how it is named:

```
> attach(Temps)
> names(Temps)
> length(TempX) # Should return '600' for 600 pieces of data
```

3 The Results:

Now that you have the data, do some analysis and organization. Your final report to Bob should at least include the following:

1. Comparison of the **range** of July temperatures on the two planets. What is the hottest day you can expect on either planet? What is the coldest July day ever recorded on each?
2. A check to make sure the brochures weren't lying. What is the mean and median July temperature on each planet?
3. Using histograms, describe for Bob what sort of temperatures he can expect to experience on PlanetX and PlanetY.
4. Again using histograms, describe to Bob what are the chances of having temperatures in the 80's on PlanetX and PlanetY. (Remember, there are $N = 600$ samples in each data set.)
5. By looking at the histograms, determine which planet temperature sample has a larger standard deviation. Explain your reasoning. Use R to compute these standard deviations.
6. Display a `boxplot` of the data. Explain to Bob what a boxplot is and why, in this case, it tells you NOT to go to PlanetY.

Again, using all the above, describe in words what the climate is like, in July, on both Planets.

4 Questions:

1. Using a histogram, how would you determine the probability (chance) that the temperature on a given day will be *less* than 50 degrees? Find this probability for PlanetX and PlanetY.
2. Again using a histogram, how would you determine the probability (chance) that the temperature on a given day will be *greater* than 80 degrees? Find this probability for PlanetX and PlanetY.
3. Explain the following statement: "On an "average day", the temperature on PlanetX is about 64 degrees. On PlanetY, the temperature on an 'average day' is probably NOT the average temperature."