# **Project 1**

## **Step 1: Load the data and perform basic operations.**

##### ***1. Load the data in using pandas.***

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##### ***2. Print the first ten rows of each dataframe.***

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##### ***3. Describe in words what each variable (column) is.***

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##### ***4. Does the data look complete? Are there any obvious issues with the observations?***

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##### ***5. Print the types of each column.***

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##### ***6. Do any types need to be reassigned? If so, go ahead and do it.***

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##### ***7. Create a dictionary for each column mapping the State to its respective value for that column. (For example, you should have three SAT dictionaries.)***

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##### ***8. Create one dictionary where each key is the column name, and each value is an iterable (a list or a Pandas Series) of all the values in that column.***

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##### ***9. Merge the dataframes on the state column.***

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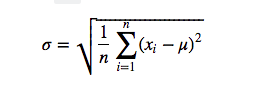
##### ***10. Change the names of the columns so you can distinguish between the SAT columns and the ACT columns.***

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##### ***11. Print the minimum and maximum of each numeric column in the data frame.***

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##### ***12. Write a function using only list comprehensions, no loops, to compute standard deviation. Using this function, calculate the standard deviation of each numeric column in both data sets. Add these to a list called sd.***



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## **Step 2: Manipulate the dataframe**

##### ***13. Turn the list sd into a new observation in your dataset.***

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##### ***14. Sort the dataframe by the values in a numeric column (e.g. observations descending by SAT participation rate)***

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##### ***15. Use a boolean filter to display only observations with a score above a certain threshold (e.g. only states with a participation rate above 50%)***

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## **Step 3: Visualize the data**

##### ***16. Using MatPlotLib and PyPlot, plot the distribution of the Rate columns for both SAT and ACT using histograms. (You should have two histograms. You might find*** [***this link***](https://matplotlib.org/users/pyplot_tutorial.html#working-with-multiple-figures-and-axes) ***helpful in organizing one plot above the other.)***

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##### ***17. Plot the Math(s) distributions from both data sets.***

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##### ***18. Plot the Verbal distributions from both data sets.***

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##### ***19. When we make assumptions about how data are distributed, what is the most common assumption?***

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##### ***20. Does this assumption hold true for any of our columns? Which?***

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##### ***21. Plot some scatterplots examining relationships between all variables.***

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##### ***22. Are there any interesting relationships to note?***

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##### ***23. Create box plots for each variable.***

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##### ***BONUS: Using Tableau, create a heat map for each variable using a map of the US.***

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## **Step 4: Descriptive and Inferential Statistics**

##### ***24. Summarize each distribution. As data scientists, be sure to back up these summaries with statistics. (Hint: What are the three things we care about when describing distributions?)***

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##### ***25. Summarize each relationship. Be sure to back up these summaries with statistics.***

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##### ***26. Execute a hypothesis test that evaluates whether or not the mean SAT and ACT participation rates are the same. Use*** α=0.05α=0.05***. Be sure to interpret your results.***

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##### ***27. Generate and interpret 95% confidence intervals for SAT and ACT participation rates.***

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##### ***28. Given your answer to 26, was your answer to 27 surprising? Why?[¶](http://localhost:8888/notebooks/Documents/DIS-Project-1/project-1/code/starter-code.ipynb#28.-Given-your-answer-to-26,-was-your-answer-to-27-surprising?-Why?)***

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##### ***29. Is it appropriate to generate correlation between SAT and ACT math scores? Why?***

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##### ***30. Suppose we only seek to understand the relationship between SAT and ACT data in 2017. Does it make sense to conduct statistical inference given the data we have? Why?***

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