# **I. Descriptives and Distributions**

For this section you can do it all by hand OR you can use Excel and JASP (hint, you will have to create a new spreadsheet in Excel first).

1. You measure 20 children’s height and find the following heights in inches:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Betty | Ishmael | Cesar | Kareem | Tiffanni | Preethi | Malcolm | Gabriella | Fortuna | Akira |
| 57 | 53 | 48 | 42 | 52 | 61 | 48 | 47 | 52 | 40 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carlos | Sarah | Jimmy | Caleb | Aurora | Wendel | Stefan | Clarissa | Jackie | Han |
| 50 | 46 | 63 | 59 | 48 | 52 | 47 | 53 | 55 | 71 |

Try using JASP to:

1. Calculate the mean: \_\_\_\_\_\_\_\_\_
2. Calculate the median: \_\_\_\_\_\_\_\_\_
3. Calculate the mode: \_\_\_\_\_\_\_\_\_
4. Calculate the range: \_\_\_\_\_\_\_\_\_
5. Calculate the standard deviation: \_\_\_\_\_\_\_\_\_

3) For the following items, use your understanding of probability to describe these 20 students. In other words, we **are not** computing the probability based off a population and so we are not using the z-table.

1. If you randomly chose one student out of these 20, what is the probability that they are *under* 49” in height? \_\_\_\_\_\_\_\_\_\_
2. **I**f you randomly chose TWO students, what is the probability they are **both** over 49”? (hint, you need to take into account the fact that these are not independent selections!): \_\_\_\_\_\_\_\_\_\_\_

*Tip: Remember that to use JASP, you first need to create a wide-format spreadsheet in Excel and save it as a .CSV file. You cannot just paste in the data in its current format.*

3) The kids in that classroom were selected for a dual-language program in which children who are fluent in English or Spanish learn their lessons in both languages in order to learn both languages. Below is a list showing which language each child speaks going into the program. Add this data to your data file.

Betty-English

Ishmael- English

Cesar- Spanish

Kareem-Spanish

Tiffanni-English

Preethi-English

Malcolm-Spanish

Gabriella-English

Fortuna-Spanish

Akira-English

Carlos- Spanish

Sarah-English

Jimmy-Spanish

Caleb-English

Aurora-English

Wendel-Spanish

Stefan-English

Clarissa-Spanish

Jackie-Spanish

Han-English

a) Get a frequency table from JASP.

b) Make a frequency chart in Excel

4) We have a deck of playing cards. There are 52 cards in total. There are four of every value card (e.g., 4 kings, 4 queens, 4 #2 cards, etc).

a) What is the probability I will randomly draw a King?

b) With the full deck, what is the probability I will randomly draw a King or Queen?

c) With the full deck, what is the probability I will randomly draw an Ace, return it to the deck, and then draw a #5 card?

d) With the full deck, what is the probability I will randomly draw a #10 card, immediately followed by a Queen?

# **II. Making Graphs in Excel**

For the following assignment, you will need to make charts on the computer using Microsoft Excel. You can use color, but make sure the graph is still comprehensible when printed in black and white. Make sure to read the instructions for each chart—some questions specify the data you should be depicting.

How do you decide which kind of chart to use? Here are some guidelines to use in addition to what we have discussed in class:

1. If a chart has a categorical variable and a continuous variable, a bar chart may be the most appropriate. Vertical bars are preferred over horizontal bars the majority of the time.
2. If a chart has two continuous variables (it may also have a third categorical variable in some cases), then a line graph or histogram may be the most appropriate.
   1. If the purpose of the graph is to show how one variable changes as a function of the other, then a line graph may be the most appropriate.
   2. If the purpose of the graph is to show the distribution of scores and you want to represent the frequency or percent of times each variable occurs, then a histogram may be most appropriate.
3. If a chart has a categorical variable and what percentages of each add up to make 100% of another variable, then a pie chart may be most appropriate. The purpose of a pie chart is to illustrate the proportions making up something.

**Additional tips**:

1. The dependent variable (outcome variable) is plotted on the Y-axis (this variable will always represent a quantity of something), while the predictor variable is plotted on the X-axis.
2. If you have three or more variables, you will need a legend and additional bars or lines

1. YouTube has tons and tons of tutorials for how to make graphs in Excel, so make sure you check there (or elsewhere on the internet) first if you need some help! Part of this assignment involves working independently and being resourceful in figuring out how to create an appropriate graph

1. Aesthetics matter! The charts you create should be easy to look at and understand (clear labeling, large and clear fonts, etc.)

PRO-TIP: You can try to copy/paste these tables straight into Excel rather than typing them out.

PRO-TIP: Use Google to find tutorials or help on any chart features you cannot figure out on your own. The truth is out there!

**Graph 1**

*Using the table below, construct a chart representing* ***TOTAL*** *government spending in 2015 (not discretionary spending). Make sure to label and title your chart.*

|  |  |  |
| --- | --- | --- |
| **Category of Spending** | **Category’s share of 2015 *discretionary* spending (%)** | **Category’s share of total 2015 spending (%)** |
| Defense and homeland security | 54 | 16 |
| Education and Veterans | 7 | 7 |
| Housing and Urban Development | 3 | 1 |
| Health and Human Services | 9 | 28 |
| Energy, EPA, Science, and NASA | 9 | 2 |
| Transportation, Labor, Food, and Agriculture | 5 | 9 |
| Social Security | 1 | 25 |
| Remainder\* | 12 | 11 |

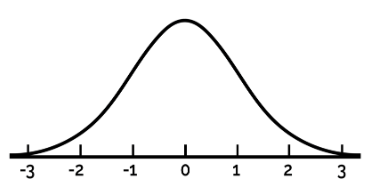
***\*****For more information on why these charts matter:*[*http://www.politifact.com/truth-o-meter/statements/2015/aug/17/facebook-posts/pie-chart-federal-spending-circulating-internet-mi/*](http://www.politifact.com/truth-o-meter/statements/2015/aug/17/facebook-posts/pie-chart-federal-spending-circulating-internet-mi/)

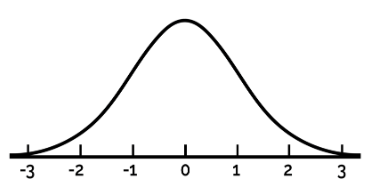
**Graph 2**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Using the following data:   |  |  | | --- | --- | | ***Year*** | ***Average Life Expectancy at Birth (in years)*** | | 1910 | 50.5 | | 1920 | 53.3 | | 1930 | 58.6 | | 1940 | 62 | | 1950 | 65.4 | | 1960 | 68.7 | | 1970 | 68.5 | | 1980 | 71.2 | | 1990 | 75.3 | | 2000 | 76.6 | | 2010 | 77.5 | | 2011 | 79.6 | | 2012 | 79.4 | | 2013 | 79.3 | | 2014 | 79.5 | | 1. Construct a chart depicting the average life expectancy for an individual in a fictional country across time. On the appropriate axis, have life expectancy go from 0-80 years of age. Make sure to label your axes and title your chart. 2. Construct a second chart in which you make the appropriate axis have life expectancy go from 40-80 years of age. Make sure to label your axes and title your chart. |

# **III. Calculating Z-Scores**

1) A community mental health center has found that on a 7-point scale about satisfaction with the services it provides to clients, the ratings are normally distributed with a mean of 4.8 and a standard deviation of 0.5. *Use the Z-table below or an online z-table reference tool to answer the questions.*

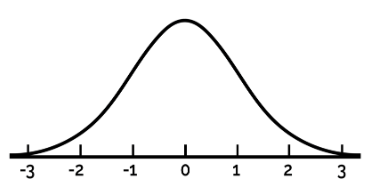
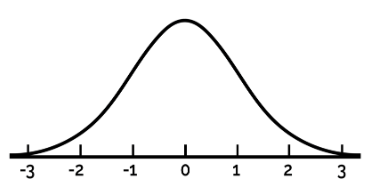
* 1. What percentage of clients rate their satisfaction above a 5?



* 1. A majority of clients, approximately 68%, rated their satisfaction between what two scores on the scale?

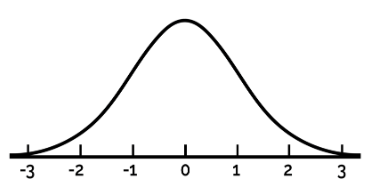
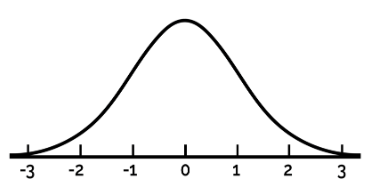
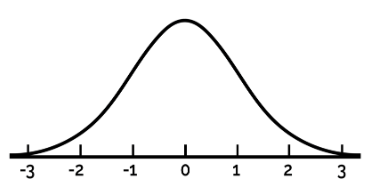
Between a \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_

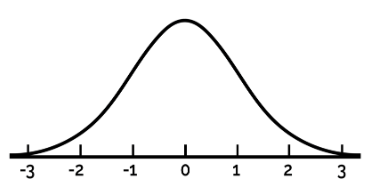
* 1. If someone had a z-score of 2.4, what satisfaction rating did they give the center?
  2. If someone had a z-score of -1.6, what satisfaction rating did they give the center?



* 1. Make sure to illustrate your answers with the sketches of the normal curves above to show your answers.

2) On a standard test of optimism, scores of people diagnosed with a particular disease are normally distributed with a mean of 20 and a standard deviation of 5. *Use the Z-table below or an online z-calculator.*

* 1. How high a score does such a person need to be among the 5% most optimistic?
  2. How high a score does such a person need to be among the 50% most optimistic?
  3. How high a score does such a person need to be among the 10% least optimistic?



* 1. What score would place a person in the 25th percentile?
  2. Illustrate your answers using the sketches of the normal curve to illustrate your answers above

**Z-Table for Reference (provides percent UNDER the z-score)**

