Advanced Psychological Statistics
PSYCH-UA.11
Department of Psychology
Fall 2021

Assignment 2

1. You decide to test the impact of caffeine intake on dream vividness. You measure the average daily amount caffeine per day (in ounces) of a group. You also obtain (average) dream vividness ratings. The data looks like –

Participant	Caffeine Intake	Dream Vividness Rating
1	24	3
2	16	7
3	20	7
4	28	7
5	14	4
6	10	4
7	6	5
8	20	7
9	23	4
10	28	6

   1. What plot would you use to best express the data?
   2. Create a plot of caffeine intake against dream vividness rating
   3. Compute a correlation coefficient
   4. Interpret the data

2. You run a personality inventory on 15 people and assess each person's level of "open-mindedness". The ratings range from 1 (not at all open-minded) to 100 (completely open minded). You get the following data –

Participant	Rating
1	94
2	65
3	46
4	79
5	69
6	12
7	67
8	22
9	47
10	79

1. Compute the mean, median and mode for the data
2. Compute the standard deviation (population and sample)
3. Which standard deviation is the more appropriate one to use? Why?
4. What r command would you use to compute the variance of the data?

3. You are asked to analyze data from a study that looked at the association between an organizational self-rating ("how organized would you rate yourself?") and social network (how many "friends" would you say you currently have at this moment?") for 15 people. The data is –

Participant	Organizational Self Rating	Number of Friends
1	9	14
2	81	12
3	57	6
4	59	9
5	51	5
6	48	19
7	32	16
8	82	7
9	44	17
10	19	20
11	10	15
12	54	13
13	20	11
14	18	3
15	15	4

1. Run a correlation on the data. What's Pearson's r?
2. Interpret the data
3. Relist the correlation by rank order below

Participant	Organizational Self Rating	Organizational Self Rating, Rank	Number of Friends	Number of Friends, Rank
1	9	1	14	10
2	81	14	12	8
3	57	12	6	4
4	59	13	9	6
5	51	10	5	3
6	48	9	19	14
7	32	7	16	12
8	82	15	7	5
9	44	8	17	13
10	19	5	20	15
11	10	2	15	11
12	54	11	13	9

13	20	6	11	7
14	18	4	3	1
15	15	3	4	2

4. Looking at the data, what do you anticipate about a Spearman's correlation analysis?
5. Run a Spearman's correlation. What is the output?
6. How does it compare to Pearson's r?
7. Create a scatter plot of the original data
8. Using lm, find the linear model for the best fit line. What is the value of the slope? What is the value of the intercept?
9. Using abline, place trendline/regression line on your scatterplot

Advanced work (...if you're interested)
Create a normal distribution

Create a data set in any range using the "seq" command. For a range of numbers, this creates a sequence from the first, to the second number, by step value you select. Try -

> x = seq(-5, 5, by = .1)

Next find the probability values, based on the normal distribution, that is associated with each value in x. (The values in 'x' will appear on the x-axis). To find what probability value, based on the normal distribution, is associated with each value in x use the "dnorm" command. The "dnorm" command returns a probability (again from the normal distribution) associated with the values of the x-axis, and based on where the mean is. (Since our range is -5 to 5, an intuitive mean could be 0.)

> y = dnorm(x, mean = 0, sd = 1.5)

- Now, plot x and y. The plot shows the probability (along the y-axis. The higher the height, the greater the likelihood) of each value (on the x-axis) of the original data set.
> plot(x,y)

- Using abline, place a line at mean (x = 0) of the figure. The line should be in any color you choose.

- Using abline, place a line that runs parallel to the x-axis and crosses the y-axis at 0.2 This line should be in a different color than the previous line and have a different thickness

- Replot the figure, but change the symbol used to an "X", and change the color

- Replot the figure one more time and change the symbols to a single line

Extra, extra R stuff

Add a title to the figure
Change the x-axis title to “Observations”
Change the y-axis to “Probability”
Change the range of the y-axis from 0 to 1 (rather than 0.0 to 0.4)