

# Psychology 205: Research Methods in Psychology

## Problem set 1

William Revelle

Department of Psychology  
Northwestern University  
Evanston, Illinois USA



March, 2021

## Problem set 1

1. For the next 9 problems, first go to the Qualtrics survey at XXXXXX and give a short answer for each problem. (You do not need to try to do the statistics necessary.0
2. For homework, please review your statistics from 201 and try to do find the answers to each problem. Send these by email to [Lizz](#).

## 1: Drug effects – independent subjects

An investigator believes that caffeine facilitates performance on a simple spelling test. Two groups of subjects are given either 200 mg of caffeine or a placebo. What test should be applied to see if these two groups differ if the results are

Hypothetical results		
Subject	Placebo	Caffeine
1	26	27
2	25	25
3	27	27
4	24	24
5	26	26
6	26	25
7	23	22
8	22	21
9	25	25
10	29	28
11	24	23
12	28	27

## 2: Another study

Another investigator noticed that the same subjects were used in both conditions. What is the proper test to determine whether there is an effect of caffeine vs. placebo in this case?

Hypothetical results		
Subject	Placebo	Caffeine
1	26	27
2	25	25
3	27	27
4	24	24
5	26	26
6	26	25
7	23	22
8	22	21
9	25	25
10	29	28
11	24	23
12	28	27

### 3:Linear relationships

Another investigator believes that introversion/extraversion has a linear relationship to spelling ability and reports the following data. What test should be applied?

Subject	Introversion	Spelling
1	21	31
2	14	33
3	13	39
4	13	24
5	20	35
6	21	37
7	11	36
8	15	20
9	23	46
10	12	31
11	17	44
12	26	44

Table: Hypothetical data

4: Another experiment

Subject	9am 0mg	9am 200mg	9pm 0	9pm 200
1	26	27	28	24
2	27	30	27	23
3	25	28	25	25
4	22	32	25	21
5	27	25	31	23
6	23	29	32	21
7	21	31	25	25
8	28	28	32	21
9	21	28	26	26
10	23	26	25	22
11	20	29	27	23
12	23	31	26	26

4: Still another investigator believes that spelling performance is a function of the interaction of caffeine and time of day. She gives 0 or 200 mg of caffeine to subjects at 9 am and 9 pm. If the results are as below, what statistical test should be applied to test her hypothesis?

## 5: Sampling

Two investigators were examining the same question: does caffeine affect performance on a simple spelling test. Assume there really is a difference of .3 standard deviations between the two populations (with/without caffeine).

One experimenter used 10 subjects, one 100

5. Which experimenter is more likely to find a difference between the two groups? Why?
6. What if there really were no difference in the population? What then? Why?

## Frequencies and mean differences

7. The number of females in a class is 16 while the number of males is 8. What test should you apply to see if this difference is unlikely, given the hypothesis of equal frequencies by gender?
8. The average height of the women in the class is 64.6 inches and that of the men is 70.2. The standard deviations are 3 for the women and 3.3 for the men. What test should you do to see how likely this difference is if the population means are identical?
9. What is the name of a statistic that should be used to describe how big this difference is that is not sensitive to the sample size?