

Practice 8

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Question 1

Alice took a test with 100 Yes/No questions (a very long one!). Alice received the tests results and she got 55 questions correctly.

The Professor wants to understand if Alice was randomly guessing the answers on the test or if Alice actually studied for the exam.

1. State the Null and Alternative hypotheses. Is alternative one-sided or two sided?
2. What is the test statistic?
3. Find the corresponding p-value.
4. Can we reject the null hypothesis at significance level 0.05?
5. What is the conclusion that the professor can make from the hypothesis testing?
6. Will the answer change if Alice got 60 correct answers on the test?

Question 2

Average salary in Google is 250K.

Elon Musk wants to check if the average salary in Twitter is the same as in Google.

1. State the Null and Alternative hypotheses. Is alternative one-sided or two sided?
2. Elon Musk knows the salaries of 30 employees in Twitter.

```
salary
```

```
## [1] 189.8 205.8 235.9 286.2 180.3 284.8 291.7 249.1 244.4 159.3 180.9 176.5
## [13] 253.1 207.6 265.5 224.7 257.6 298.8 207.0 266.6 290.2 181.8 247.8 168.8
## [25] 190.1 207.9 152.0 207.4 280.5 201.1
```

He computed the mean of this sample:

```
mean(salary)
```

```
## [1] 226.44
```

In addition, an insider shared that the population variance of the salary in Twitter is 6000.

What is the value of the test statistic?

3. Find the corresponding p-value.
4. Can we reject the null hypothesis at significance level 0.05?
5. What is the conclusion that Elon Musk can make from the hypothesis testing?
6. Will the answer change if we use 0.1 significance level?
7. Elon Musk doesn't trust insiders. He decided to estimate the sample variance and check the information he was provided with. He was surprised to get much smaller value of

```
var(salary)
```

```
## [1] 1961.936
```

What is the value of the test statistic in this case?

8. Can we reject the null hypothesis at significance level 0.05?