

**MATH-321 Statistics II - Fall 2021**

**Homework 2**

***Exercise 1***

Automobile insurance companies take many factors into consideration when setting rates. These factors include age, experience, previous accidents and miles driven per year. One such company wished to know the effect of gender on miles driven. Let  and  be the miles driven per year by men and women, respectively. A random sample of 18 men and a random sample of 15 women were selected independently in January of this year. Let  and  be the miles driven during the past year by the men and the women in the samples, respectively. The measurements, in thousand kilometers, are given below. At the 5% level of significance, do the samples provide enough evidence to conclude that the mean number of kilometers driven per year by women is smaller than the mean number of kilometers driven per year by men?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Men | | |  | Women | | |
| Car | km | Group | Car | km | Group |
| 1 | 18.8 | 1 | 19 | 17.3 | 2 |
| 2 | 16.6 | 1 | 20 | 22.4 | 2 |
| 3 | 20.6 | 1 | 21 | 12.1 | 2 |
| 4 | 18.4 | 1 | 22 | 13.0 | 2 |
| 5 | 17.7 | 1 | 23 | 17.0 | 2 |
| 6 | 15.9 | 1 | 24 | 11.0 | 2 |
| 7 | 17.5 | 1 | 25 | 20.8 | 2 |
| 8 | 19.7 | 1 | 26 | 14.9 | 2 |
| 9 | 21.6 | 1 | 27 | 17.8 | 2 |
| 10 | 18.6 | 1 | 28 | 18.4 | 2 |
| 11 | 16.7 | 1 | 29 | 18.8 | 2 |
| 12 | 17.0 | 1 | 30 | 13.6 | 2 |
| 13 | 19.7 | 1 | 31 | 16.7 | 2 |
| 14 | 16.8 | 1 | 32 | 15.3 | 2 |
| 15 | 15.9 | 1 | 33 | 18.5 | 2 |
| 16 | 19.0 | 1 |  | | |
| 17 | 21.8 | 1 |
| 18 | 22.3 | 1 |

1. Specify the null and the alternative hypotheses for the Levene’s test.
2. Find the value of the test statistic of the Levene’s test.
3. Find the *p*-valueof the Levene’s test.
4. Conclude the Levene’s test at 
5. Specify the null and the alternative hypotheses for the independent samples *t*-test.
6. Find the value of the test statistic of the independent samples *t*-test.
7. Find the *p*-valueof the independent samples *t*-test.
8. Conclude the independent samples *t*-test.
9. Find the degrees of freedom of the test statistic of the independent samples *t*-test.

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***Exercise 2***

A recruiter for a computer company would like to determine if there are differences in sales ability in electronic products between business, social sciences arts and sciences graduates. Let  , and  be the sales by recent graduates whose degrees are in business, social sciences and sciences, respectively. The recruiter convinced a large computer company to hire 10 recent graduates from each area of study. The 30 graduates in the sample went through intensive training for one month and then began working in the sales department. After two months the total sales of each person in the sample was recorded. Let  , and  be the total sales during these two months of the graduates in business, social sciences and science in the sample, respectively. The sample measurements are in thousand dollars and are given below. At the 5% level of significance, is there sufficient evidence in the samples to allow the recruiter to conclude that there are differences in sales ability among the holders of three types of degrees?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Business: | |  | Social Sciences: | |  | Sciences: | |
| Sales | Group | Sales | Group | Sales | Group |
| 33.0 | 1 | 33.8 | 2 | 24.2 | 3 |
| 26.1 | 1 | 27.0 | 2 | 36.1 | 3 |
| 36.1 | 1 | 23.2 | 2 | 22.8 | 3 |
| 33.7 | 1 | 35.7 | 2 | 27.2 | 3 |
| 39.4 | 1 | 27.3 | 2 | 24.6 | 3 |
| 34.0 | 1 | 29.1 | 2 | 21.9 | 3 |
| 29.2 | 1 | 22.8 | 2 | 21.6 | 3 |
| 22.2 | 1 | 31.7 | 2 | 20.5 | 3 |
| 30.3 | 1 | 39.8 | 2 | 24.6 | 3 |
| 23.2 | 1 | 25.6 | 2 | 25.0 | 3 |

1. Specify the null and the alternative hypotheses.
2. Find the value of the test statistic.
3. Find the *p*-value.
4. Conclude the test.