**Tutorial Class 05 – Statistics**

1.

We know that and .

Assuming the sample data is normally distributed, the sample statistic, , is distributed as

Standardizing we get

a)

b)

c)

The test statistic is now the difference between the sample means of the two classes. Hence, we need to change the parameters accordingly.

Standardizing the test statistic, we get

We want to find the probability that the test statistic has a value greater than .

d)

Since the population mean is given to be , the larger sample size will be more likely to have a sample mean that is closer to the population mean. Thus, the class of size most likely has an average score of and the class of size most likely has an average score of .

2.

The test statistic is the sample mean, which we can calculate as

Standardizing this, we get

Since we are told that the confidence level is , we know that and . Hence,

Thus, the confidence interval is given as or .

3.

We are given the two population means as and and the common variance as . The test statistic in this case is the difference between the sample means of the two tests. This is distributed as

Standardizing this, we get

The confidence level is given as , which means . Since the mean running time needs to be proven to have reduced,

Hence, the confidence interval is or .

4.

a)

The null and alternate hypotheses relate to the population mean, which is here. Thus,

b)

We are given a sample where we are told that the sample mean is and the sample variance is . Standardizing the sample mean, we get

At a percent level of significance . For this value, .

Since , the hypothesis should be rejected by the judge.

c)

The -value is given by

5.

We are told that the test statistic is

We know that

We are not actually given values for , or , so we cannot find actual values for the result. The general form of the result will be

6.

We can calculate two different sample means for the two sets of data.

Our test statistic will be the difference between the sample means.

We also need to know the sample variances, in order to calculate the pooled variance.

Finally, we can standardize the test statistic to

Assuming that and are equal,

Hence,

For a two-tailed -distribution,

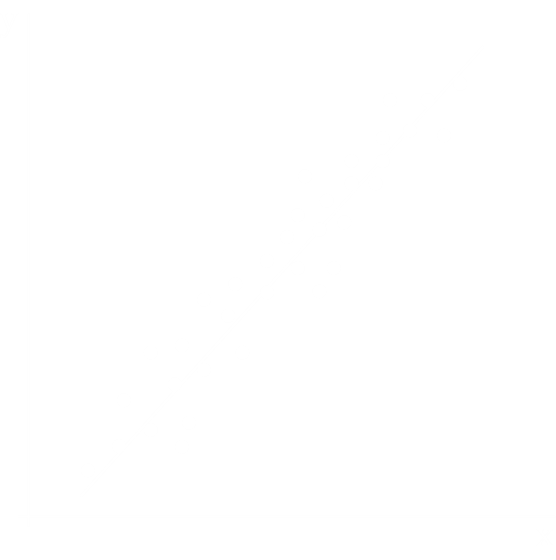
This suggest that there is a good chance pulse rates decreased after jogging.

7.

This question relates to the following table:

|  |  |  |
| --- | --- | --- |
| Year | Sunspots | Auto Accidents Deaths  (1,000s) |
| 70 | 165 | 54.6 |
| 71 | 89 | 53.3 |
| 72 | 55 | 56.3 |
| 73 | 34 | 49.6 |
| 74 | 9 | 47.1 |
| 75 | 30 | 45.9 |
| 76 | 59 | 48.5 |
| 77 | 83 | 50.1 |
| 78 | 109 | 52.4 |
| 79 | 127 | 52.5 |
| 80 | 153 | 53.2 |
| 81 | 112 | 51.4 |
| 82 | 80 | 46 |
| 83 | 45 | 44.6 |

We can use this data to plot of graph of the number of sunspots on the -axis and the number of auto accident deaths on the -axis.



We know that,

We need to find and . We know that

and

Thus, we can find and using MLE or the least squares method.

Since ,

This would ensure that is independent of .

Since is not know, we need to utilize .

-value