

**كلية العلوم**

**قسم الإحصاء وبحوث العمليات**

**College of Sciences**

**Department of**

**Statistics and Operations Research**

Homework 2

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| **Deadline: ……….****12 PM** | **STAT 105** | **Academic year 1438-39H**  |
| **Statistical Methods** |  **Second Semester** |

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| **Section No.** |  | **رقم الشعبة** |
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Exercise 1: (4 marks)

A manufacturer claims that the average tar content of a certain kind of cigarette is *μ* = 14*.*5. In an attempt to show that it differs from this value, five measurements are made of the tar content (mg per cigarette):

14*.*5 14*.*2 14*.*4 14*.*3 14*.*6

Assume normality of the population from which the sample came.

1. Test the claim of this manufacturer, at *α* = 0*.*05.
2. Get the p-value. Comment.
3. Find 95% confidence interval for *μ*, comment.

Exercise 2: (4 marks)

The dynamic modulus of concrete is obtained for two different concrete mixes. For the first mix, $n\_{1}$ =33, $\overbar{x}$=120*.*1, and $s\_{1}$ =0*.*47 psi. For the second mix, $n\_{2}$ =31, $\overbar{y}$=114*.*6, and $s\_{2}$ =0*.*38. psi.

1. Test with *α* =0*.*05,$ μ\_{1}-μ\_{2 }>$ 5 psi
2. Get the p-value. Comment.
3. Find 95% confidence interval for ,$ μ\_{1}-μ\_{2 }.$ Comment.

Exercise 3: (7 marks)

⏩ A study was made to determine if a certain metal treatment has any effect on the amount of metal removed in a pickling operation. A random sample of 12 pieces was immersed in a bath of 24 hours without treatment, yielding an average of 19 millimeters of metal removed and a sample variance of 1.8 millimeters. A second sample of 8 pieces was exposed to the treatment followed by the 24-hour immersion in the bath, resulting in an average removal of 17 millimeters of metal with a sample variance of 1.5 millimeter. Assume that the population variances are equal. To find a 95 % confidence interval (C.I.) of the difference between the two population's means , assuming they came from two independent normal distributions.

A) find:

1. the good point estimate of the difference between the two population's means .
2. the estimate of the pooled variance .
3. the maximum error (margin of error) .
4. the lower bound of the of the 95 % confidence interval of the difference between the two population's means .

B) test $(H\_{0}: μ\_{1}=μ\_{2}Or μ\_{1}\leq μ\_{2})$ against H1: ) with a significance level 0.05.