Assignment 8

Due on 2020-03-25, 23:09 BT!

The due date for submitting this assignment has passed. For your reference, you can view the assignment.

Week 1

1. The design engineer has to design an air management system for high altitude regions due to the high pressure during the winter season. The system consists of an intake valve and a blower motor that powers the system. The intake valve contains a pressurized and the blower motor is pressurized through the intake valve to avoid blocking of intake due to high pressure. The design engineer needs to design a blower motor that has the following:

   - 500 watts
   - 0.5 m/s airflow
   - 0.05 m/s airflow
   - 0.05 m/s airflow
   - 0.05 m/s airflow
   - 0.05 m/s airflow

   - No, the answer is incorrect.
   - Accepted Answer: Design the blower motor accordingly.
   - 1.0 point

Week 2

2. Consider the above system as a system discussed in question 1. The design engineer tested 10 systems and calculated a standard error for the system to be 0.03 m/s with a standard deviation of 0.05 m/s. The system is not expected to be the same in the real-world setting.

   - 0.03 m/s airflow
   - 0.03 m/s airflow
   - 0.03 m/s airflow
   - 0.03 m/s airflow
   - 0.03 m/s airflow
   - 0.03 m/s airflow

   - No, the answer is incorrect.
   - Accepted Answer: 0.03 m/s airflow
   - 1.0 point

Week 3

3. A product design engineer needs to test a product that has a new design and product tested is more efficient than the older product. The type of test for this product is given for:

   - Accept the null hypothesis when new product is more efficient
   - Reject the null hypothesis when new product is not more efficient
   - Accept the null hypothesis when new product is not more efficient
   - Reject the null hypothesis when new product is more efficient

   - No, the answer is incorrect.
   - Accepted Answer: Accept the null hypothesis when new product is more efficient
   - 1.0 point

Week 4

4. A random sample of 20 is drawn from normal population. In order to test the null hypothesis that the mean $\mu$ is not the alternative to the mean $\mu_0$ under the null hypothesis for the test statistic $t = \text{standard deviation}$.

   - Standard normal distribution
   - t distribution with 20 degrees of freedom
   - t distribution with 18 degrees of freedom
   - t distribution with 17 degrees of freedom
   - t distribution with 16 degrees of freedom

   - No, the answer is incorrect.
   - Accepted Answer: Standard normal distribution
   - No, the answer is incorrect.
   - Accepted Answer: 1.0 point

Week 5

5. Suppose the null of a t-test seems to follow the normal distribution. The marks are slightly lower than the mean. A test of 100 is held with a standard deviation of 7. As a consumer, we test the two hypotheses: $H_0: \mu = 100$ vs $H_1: \mu < 100$. Two hypothesis tests are tested and the product will be accepted by the consumer. The size of the reject is $\alpha = 0.05$. Find the probability of type II error.

   - 0.0586
   - 0.0586
   - 0.0586
   - 0.0586

   - No, the answer is incorrect.
   - Accepted Answer: 0.0586
   - 1.0 point

Week 6

6. A company that manufactures oven pans uses a high-strength steel from a supplier intended to be a rush. The supplier reports that steel has a mean strength of 30000 MPa with standard deviation of 1200 MPa. If the samples of steel are tested for strength and found that the strength was 24100 MPa, if the significant level is 0.05 then the oven is not accepted.

   - No, the answer is incorrect.
   - Accepted Answer: String sample with rejected
   - 1.0 point

Week 7

3. A home appliance manufacturer has published data on the power used by various home appliances in kWh per year. The main claim is that vacuum cleaner uses on average of 6 kWh per year. If a sample of 40 is collected and studied, it is observed that an average of 42 kWh with a standard deviation of 5 kWh power is used by the vacuum cleaner. We are to know if, in the terms of the data, the mean annual power consumption of the vacuum cleaner is less than 4 kWh with a 0.05 level of significance. Test the alternative hypothesis for the problem.

   - $H_0: \mu = 42$ vs $H_1: \mu < 42$
   - $H_0: \mu = 42$ vs $H_1: \mu > 42$
   - $H_0: \mu = 42$ vs $H_1: \mu = 42$
   - $H_0: \mu = 42$ vs $H_1: \mu \neq 42$

   - No, the answer is incorrect.
   - Accepted Answer: String sample with rejected
   - 1.0 point

Week 8

4. Consider an independent Bernoulli trial with probability of success $p$. To test the hypotheses that $p = 0.4$ against the alternative that $p > 0.4$, a random sample from the binomial distribution is to be taken. The sample is to be 5 and the statistical decision rule is to be $\chi^2 > \chi^2_{0.05, 5}$.

   - $H_0$ vs $H_1$ decision
   - $H_0$ vs $H_1$ decision
   - $H_0$ vs $H_1$ decision
   - $H_0$ vs $H_1$ decision

   - No, the answer is incorrect.
   - Accepted Answer: String sample with rejected
   - No, the answer is incorrect.
   - Accepted Answer: $\chi^2 > \chi^2_{0.05, 5}$

Note: Don't use ‘$\chi$’ before and after superscript as shown in example.