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Courses » Design and Analysis of Experiments

Announcements Course Ask a Question Progress Mentor

Unit 3 - Week 2

Course outline

How to access the portal

Week 1

Week 2

- Lecture 6: Random Variable and Probability Distribution
- Lecture 7: Normal Distribution
- Lecture 8: Sampling Distribution
- Lecture 9: Estimation
- Lecture 10: Estimation (Contd.)
- Lecture 11: Hypothesis Testing
- Lecture 12: Determination of Sample Size

Feedback for Week 2

Quiz : Week_2_Assignment_2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week_2_Assignment_2

The due date for submitting this assignment has passed. **Due on 2018-02-07, 23:59 IST.**

Submitted assignment

Questions 1-3 are based on the following case:

Twenty observations on etch uniformity on silicon wafers are taken during a qualification experiment for a plasma etcher. The data are as follows: (Use $\alpha=0.05$)

5.34	6.65	4.76	5.98	7.25
6.00	7.55	5.54	5.62	6.21
5.97	7.35	5.44	4.39	4.98
5.25	6.35	4.61	6.00	5.32

1) The expression for population variance in this case? S=sample standard deviation **2 points**

(i) $\sigma^2 = \frac{(n-1)S^2}{\chi^2_{\frac{\alpha}{2},(n-1)}}$

(ii) $\sigma^2 = \frac{(n-1)S^2}{\chi^2_{\frac{\alpha}{2},n}}$

(iii) $\sigma^2 = \frac{nS^2}{\chi^2_{\frac{\alpha}{2},(n-1)}}$

(iv) $\sigma^2 = \frac{(n-1)S}{\chi^2_{\frac{\alpha}{2},(n-1)}}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

(i) $\sigma^2 = \frac{(n-1)S^2}{\chi^2_{\frac{\alpha}{2},(n-1)}}$

2) Construct a 95 percent confidence interval estimate of σ^2 **2 points**

(i) $0.457 < \sigma^2 < 1.686$

(ii) $0.457 < \sigma^2 < 2.686$

(iii) $0.657 < \sigma^2 < 1.686$

Week 9

Week 10

Week 11

Week 12

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(iv) $0.401 < \sigma^2 < 2.686$

No, the answer is incorrect.**Score: 0****Accepted Answers:**

(i) $0.457 < \sigma^2 < 1.686$

3) Let $H_0: \sigma^2 = 1.0$ and $H_1: \sigma^2 \neq 1.0$. The conclusion in this test is**2 points**

- (i) Reject the hypothesis
- (ii) Accept the hypothesis
- (iii) Can't be said
- (iv) Data Inadequate

No, the answer is incorrect.**Score: 0****Accepted Answers:**(ii) *Accept the hypothesis***Questions 4-5 are based on the following case:**Consider the following data set. (Use $\alpha=0.05$)

Observation	Data
1	20
2	30
3	40
4	50
5	60

4) The value of the population variance is

2 points

- (i) 89.77
- (ii) 95.65
- (iii) 9.47
- (iv) 11.5

No, the answer is incorrect.**Score: 0****Accepted Answers:**(i) *89.77*5) Let $H_0: \sigma^2 = 100$ and $H_1: \sigma^2 \neq 100$. The conclusion in this test is**2 points**

- (i) Reject the null hypothesis
- (ii) Accept the null hypothesis
- (iii) Can't be said
- (iv) Data Inadequate

No, the answer is incorrect.**Score: 0****Accepted Answers:**(ii) *Accept the null hypothesis*

6) The expression for pool variance for two population is

2 points

(i) $S_P^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}$

$$(ii) S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}$$

$$(iii) S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2}$$

$$(iv) S_p^2 = \frac{n_1 S_1^2 + n_2 S_2^2}{n_1+n_2}$$

No, the answer is incorrect.**Score: 0****Accepted Answers:**

$$(i) S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}$$

7) The Formula for the probability of type II error (β) is**2 points**

- (i) $\beta = P(\text{reject } H_0 | H_0 \text{ is true})$
- (ii) $\beta = P(\text{fail to reject } H_0 | H_0 \text{ is true})$
- (iii) $\beta = P(\text{reject } H_0 | H_0 \text{ is false})$
- (iv) $\beta = P(\text{fail to reject } H_0 | H_0 \text{ is false})$

No, the answer is incorrect.**Score: 0****Accepted Answers:***(iv) $\beta = P(\text{fail to reject } H_0 | H_0 \text{ is false})$*

Questions 8-10 are based on the following case:

The time to repair an electronic instrument is a normally distributed random variable measured in hours. The repair time for 16 such instruments chosen at random are as follows: (Use $\alpha=0.05$)

Hours			
159	280	101	212
224	379	179	264
222	362	168	250
149	260	485	170

8) You wish to know if the mean repair time exceeds 225 hours. The appropriate hypotheses for investigating this claim are

2 points

-
- (i) $H_0 : \mu = 225; H_1 : \mu \neq 225$
-
- (ii) $H_0 : \mu = 225; H_1 : \mu > 225$
-
- (iii) $H_0 : \mu = 225; H_1 : \mu < 225$
-
- (iv) $H_0 : \mu > 225; H_1 : \mu < 225$

No, the answer is incorrect.**Score: 0****Accepted Answers:***(ii) $H_0 : \mu = 225; H_1 : \mu > 225$*

9) For the hypothesis, set in Q.8, the t value is

2 points

- (i) $t = 1.45$
- (ii) $t = 1.58$
- (iii) $t = 2.01$
- (iv) $t = 0.67$

No, the answer is incorrect.

Score: 0

Accepted Answers:

(iv) t = 0.67

10) The tabulated t value for this investigation is

2 points

- (i) t = 1.45
- (ii) t = 0.67
- (iii) t = 2.01
- (iv) t = 1.753

No, the answer is incorrect.

Score: 0

Accepted Answers:

(iv) t = 1.753

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