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 $\alpha=0.05$)

<table>
<thead>
<tr>
<th></th>
<th>5.34</th>
<th>6.65</th>
<th>4.76</th>
<th>5.98</th>
<th>7.25</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.00</td>
<td>7.55</td>
<td>5.54</td>
<td>5.62</td>
<td>6.21</td>
</tr>
<tr>
<td></td>
<td>5.97</td>
<td>7.35</td>
<td>5.44</td>
<td>4.39</td>
<td>4.98</td>
</tr>
<tr>
<td></td>
<td>5.25</td>
<td>6.35</td>
<td>4.61</td>
<td>6.00</td>
<td>5.32</td>
</tr>
</tbody>
</table>

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

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

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

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

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

   **No, the answer is incorrect.**

   **Score: 0**

   **Accepted Answers:**

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

2) Construct a 95 percent confidence interval estimate of $\sigma^2$

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

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

   (iii) $0.657 < \sigma^2 < 1.686$
3) Let $H_0: \sigma^2 = 1.0$ and $H_1: \sigma^2 \neq 1.0$. The conclusion in this test is

- (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 $\alpha = 0.05$)

<table>
<thead>
<tr>
<th>Observation</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

4) The value of the population variance is

- (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

- (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

\[ s_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 2} \]

- (i) 0.401 < $\sigma^2$ < 2.686
- (ii) 0.457 < $\sigma^2$ < 1.686

No, the answer is incorrect.
Score: 0
Accepted Answers:
(i) 0.457 < $\sigma^2$ < 1.686
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(ii) \( S^2_p = \frac{(n_1-1)s^2_1+(n_2-1)s^2_2}{n_1+n_2-2} \)

(iii) \( S^2_p = \frac{(n_1-1)s^2_1 + (n_2-1)s^2_2}{n_1+n_2} \)

(iv) \( S^2_p = \frac{n_1s^2_1+n_2s^2_2}{n_1+n_2} \)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(i) \( S^2_p = \frac{(n_1-1)s^2_1+(n_2-1)s^2_2}{n_1+n_2-2} \)

7) The Formula for the probability of type II error (\( \beta \)) is

- (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 \( \alpha=0.05 \))

<table>
<thead>
<tr>
<th>Hours</th>
<th>159</th>
<th>208</th>
<th>101</th>
<th>212</th>
</tr>
</thead>
<tbody>
<tr>
<td>224</td>
<td>379</td>
<td>179</td>
<td>204</td>
<td></td>
</tr>
<tr>
<td>222</td>
<td>362</td>
<td>168</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>149</td>
<td>260</td>
<td>485</td>
<td>170</td>
<td></td>
</tr>
</tbody>
</table>

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

- (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

- (i) \( t = 1.45 \)
- (ii) \( t = 1.58 \)
- (iii) \( t = 2.01 \)
- (iv) \( t = 0.67 \)
The tabulated t value for this investigation is

- (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) $t = 1.753$