Universitat Politecnica de Catalunya

Statistical Inference 2020-10-15

Personal Data

Family Name:

Given Name:

Signature:

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Registration Number

0 1 2 3 4 5 6 7 8 9

In this section **no** changes or modifications must be made!

Scrambling 0 0

Type: 005

Exam ID: 20101500001

Please mark the boxes carefully: ☒ Not marked: ☐ or ■

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Only clearly marked and positionally accurate crosses will be processed!

Answers 1 - 4

	a	b	c	d	e
1	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐

1. *(2.5 points)* Which of the following cities are the capital of the corresponding country?
   (a) Astana (Kazakhstan)
   (b) Sao Paulo (Brazil)
   (c) Lagos (Nigeria)
   (d) Auckland (New Zealand)
   (e) Tokyo (Japan)

2. *(2.5 points)* The waiting time (in minutes) at the cashier of two supermarket chains with different cashier systems is compared. The following statistical test was performed:

```
    Two Sample t-test

data:  Waiting by Supermarket
t = -1.7778, df = 129, p-value = 0.9611
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 -1.798932       Inf
sample estimates:
 mean in group Sparag mean in group Consumo
             2.971335              3.902499
```

   Which of the following statements are correct? (Significance level 5%)
   (a) The absolute value of the test statistic is larger than 1.96.
   (b) A one-sided alternative was tested.
   (c) The p-value is larger than 0.05.
   (d) The test shows that the waiting time is longer at Sparag than at Consumo.
   (e) The test shows that the waiting time is shorter at Sparag than at Consumo.

3. *(2.5 points)* In a small city the satisfaction with the local public transportation is evaluated. One question of interest is whether inhabitants of the city centre are more satisfied with public transportation compared to those living in the suburbs.
   A survey with 250 respondents gave the following contingency table:

Evaluation	Location: city centre	suburbs
very good	18	12
good	43	25
bad	31	63
very bad	8	50

   The following table of percentages was constructed:

Evaluation	Location: city centre	suburbs
very good	60.0	40.0
good	63.2	36.8
bad	33.0	67.0
very bad	13.8	86.2

   Which of the following statements are correct?
   (a) The percentage table contains column percentages.
   (b) The percentage table gives the location distribution for each level of satisfaction.

(c) The value in row 3 and column 1 in the percentage table indicates: 33 percent of the respondents lived in the city centre and evaluated the public transportation as bad.

(d) The value in row 4 and column 2 in the percentage table indicates: 86.2 percent of those, who evaluated the public transportation as very bad, live in the suburbs.

(e) The percentage table can be easily constructed from the original contingency table: percentages are calculated for each row.

4. *(2.5 points)* A machine fills milk into 1000ml packages. It is suspected that the machine is not working correctly and that the amount of milk filled differs from the setpoint $\mu_0 = 1000$. A sample of 154 packages filled by the machine are collected. The sample mean $\bar{y}$ is equal to 1073 and the sample variance s^2_{n-1} is equal to 2532.16.

   Test the hypothesis that the amount filled corresponds on average to the setpoint. What is the value of the *t* test statistic?

   (a) -36.298

   (b) -80.516

   (c) 18.003

   (d) 14.705

   (e) 31.757