Universitat Politecnica de Catalunya

Statistical Inference 2020-10-15

Personal Data

Family Name:

Given Name:

Signature:

checked

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: 20101500004

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) Istanbul (Turkey)
   (b) Lagos (Nigeria)
   (c) Astana (Kazakhstan)
   (d) Sao Paulo (Brazil)
   (e) Warsaw (Poland)

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 = 3.4269, df = 126, p-value = 0.9996
alternative hypothesis: true difference in means is less than 0
95 percent confidence interval:
     -Inf 2.598384
sample estimates:
 mean in group Sparag mean in group Consumo
             4.608305              2.856835
```

   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:

	Location	
Evaluation	city centre	suburbs
very good	22	22
good	42	25
bad	21	59
very bad	15	44

   The following table of percentages was constructed:

	Location	
Evaluation	city centre	suburbs
very good	22.0	14.7
good	42.0	16.7
bad	21.0	39.3
very bad	15.0	29.3

   Which of the following statements are correct?
   (a) The value in row 1 and column 2 in the percentage table indicates: 14.7 percent of those living in the suburbs evaluated the public transportation as very good.

(b) The percentage table can be easily constructed from the original contingency table: Each value is related to the total sample size.

(c) The percentage table gives the location distribution for each level of satisfaction.

(d) The percentage table contains row percentages.

(e) The value in row 3 and column 2 in the percentage table indicates: 39.3 percent of the respondents in the suburbs evaluated the public transportation as bad.

4. *(2.5 points)* A machine fills milk into 250ml packages. It is suspected that the machine is not working correctly and that the amount of milk filled differs from the setpoint $\mu_0 = 250$. A sample of 167 packages filled by the machine are collected. The sample mean $\bar{y}$ is equal to 227.5 and the sample variance s^2_{n-1} is equal to 198.72.

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

   (a) -20.626

   (b) 40.690

   (c) 3.716

   (d) 30.416

   (e) 24.885