



UFPR

Bioestatística 2018-02-26



Dados pessoais

Sobrenome:
Prenome:
Assinatura:
verificado

Número de matrícula

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Neste campo **não** podem ser realizadas modificações dos dados.

Categoria Identidade do documento(CE001)

105

18022600002

Marcar cuidadosamente: ☒ Não marcado: ☐ ou ☐

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**Somente cruzees claramente reconhecíveis e em posição exata serão avaliadas!**

Respostas 1 - 5

	a	b	c	d	e
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	a	b	c	d	e





1. (2 pontos) 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 201 packages filled by the machine are collected. The sample mean  $\bar{y}$  is equal to 1096.2 and the sample variance  $s_{n-1}^2$  is equal to 2201.19.

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

- (a) -52.640
- (b) 29.070
- (c) 0.001
- (d) 7.468
- (e) -12.762

2. (2 pontos) Compute the Hessian of the function

$$f(x_1, x_2) = -7x_1^2 - 4x_1x_2 - 6x_2^2$$

at  $(x_1, x_2) = (5, 0)$ . What is the value of the upper right element?

- (a) -4
- (b) -14
- (c) -12
- (d) -20
- (e) -19

3. (2 pontos) A survey with 49 persons was conducted to analyze the design of an advertising campaign. Each respondent was asked to evaluate the overall impression of the advertisement on an eleven-point scale from 0 (bad) to 10 (good). The evaluations are summarized separately with respect to type of occupation of the respondents in the following figure.



To analyze the influence of occupation on the evaluation of the advertisement an analysis of variance was performed:

	Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
1	48	35.108				
2	45	25.368	3	9.740	5.759	0.0020153

Which of the following statements are correct?

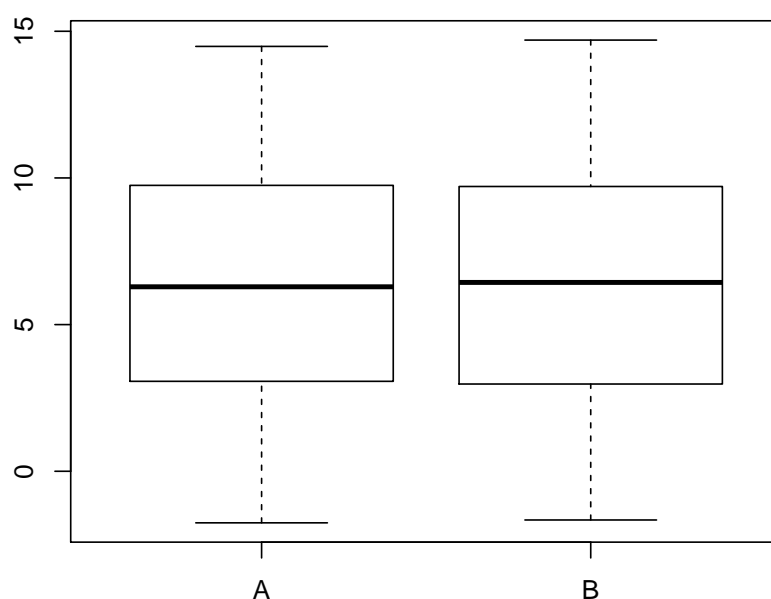
- (a) It can be shown that the evaluation of the respondents depends on their occupation. (Significance level 5%)
  - (b) The fraction of explained variance is larger than 10%.
  - (c) A one-sided alternative was tested for the mean values.
  - (d) The test statistic is smaller than 15.8.
  - (e) The fraction of explained variance is smaller than 12%.
4. (2 pontos) 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 = -4.0096, df = 105, p-value = 5.702e-05
alternative hypothesis: true difference in means is less than 0
95 percent confidence interval:
 -Inf -1.460933
sample estimates:
mean in group Sparag mean in group Consumo
      3.715680          6.208227
```

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.
5. (2 pontos) In the following figure the distributions of a variable given by two samples (A and B) are represented by parallel boxplots. Which of the following statements are correct? (Comment: The statements are either about correct or clearly wrong.)



- (a) The location of both distributions is about the same.
- (b) Both distributions contain no outliers.

- (c) The spread in sample A is clearly bigger than in B.
- (d) The skewness of both samples is similar.
- (e) Distribution A is right-skewed.





