

Homework 3. Extra points for theoretical exam mark: 0.2 pct.

Deadline: Friday 9th January 2026.

You will receive 0.2 pct. to the theoretical exam if your mark for this homework is between 6 to 10.

Objective: - prepare for the theoretical exam

Request – work alone as at the exam, read the courses. Evaluate yourself. Put all your attention and concentration, this will help you to pass the theoretical exam. The questions at the theoretical exam will be similar.

Resolve the following problems:

1. A study was conducted:

“The aim of this study was to assess the prevalence of early childhood caries (ECC) in children and investigate the influence of sociodemographic variables, quality of oral hygiene and child-related aspects.” The authors investigate 600 children. The following results were adapted from the [Corrêa-Faria P, Martins-Júnior PA, Vieira-Andrade RG, Marques LS, Ramos-Jorge ML. Factors associated with the development of early childhood caries among Brazilian preschoolers. Braz Oral Res. 2013 Jul-Aug;27(4):356-62.]:

Table 1. Distribution of ECC according to some studied parameters.

	ECC		p-value (chi square test)
	No n (%)	Yes n (%)	
Place of residence			
Urban area	207 (50.4)	204 (49.6)	0.001
Rural area	68 (36.0)	121 (64.0)	
Gender			
Male	128 (44.4)	161 (55.7)	0.46
Female	147 (47.3)	164 (52.7)	

For interpretation of chi-square test results (see Lectures)

a. For *Place of residence* variable:

- i. State the null and alternative hypotheses:
 - ...
 - ...
- ii. Give the interpretation of the obtained p-value:
 - ...

b. For *Gender* variable:

- i. State the null and alternative hypotheses:
 - ...
 - ...
- ii. Give the interpretation of the obtained p-value:
 - ...

2. Of 5000 patients which underwent teeth whitening procedures, 325 experienced early coloration of the teeth after the procedure. Of 325 with early coloration 153 are smokers. Of 5000 patients 2600 are non-smokers. Question: People who smoke are more likely to have the early coloration of the teeth?

a. Formulate the null hypothesis and alternative hypothesis

H₀:

H_a:

b. Make the contingency table

c. Compute the theoretical frequency table

d. Compute the parameter of the chi-square test

e. Interpret the result based on the value of the parameter of the test and the critical rejection region [3,84; +∞)

3. In an experiment the tooth decays in 50 teeth were filled with two different materials, sample A 25 teeth, sample B the other 25 teeth. The pressure forces on teeth cavities made by both materials were measured in the first minute after the procedure. Arithmetic means and standard deviations were computed for each sample. The variations were equal and the values were normal distributed. Suppose that the result of a statistical test that compare the two arithmetic means was p-value = 0.04. If the significance level for the test is $\alpha = 0.05$ resolve the following questions:

a. Which statistical test do you consider that is appropriate to apply in this case?

b. State the null and alternative hypothesis.

H₀:

H_a:

c. Interpret the p value. Which is the conclusion of the experiment?

4. Scenario: There were included in the study children in the care of two types of dental offices: Public and Private schools. The purpose of the study was to study the differences between the two types of patients care regarding dental hygiene, the number of cavities, etc.

The coefficients of correlation were computed in the following table. Interpret the degree of association using the empirical rules of Colton. (see Lectures).

Parameters	Parameters	Pearson correlation coefficient	Degree of association (Colton rules)	Direct/ Inverse
Number of tooth with decay	Age	-0.37	?	?
Number of tooth brushing/day	Age	0.91	?	?
Number of tooth brushing/day	Age	0.21		
Number of tooth	Number of tooth with decay	0.33		
Number of tooth brushing/day	Number of tooth with decay	-0.82		

**Number of tooth
brushing/day**

Number of tooth

0.19
