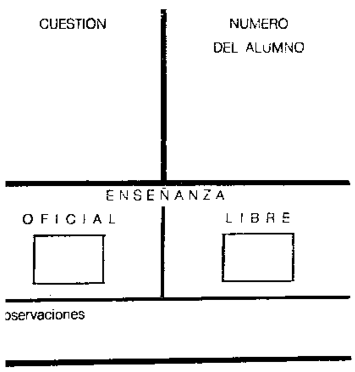
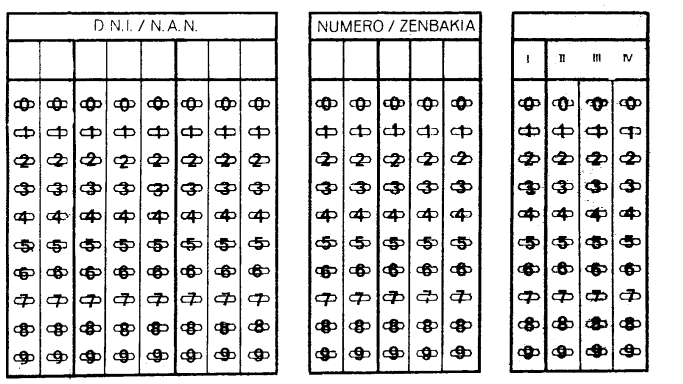
INSTRUCTIONS

1. The exam contains multiple choice questions that must be answered in the orange code sheet we have provided you with.
2. To select an answer, all you need to do is mark in the orange code sheet, **filling the rectangle over which the selected answer is located appropriately**. Please make sure you know the answer you wish to mark before doing it. Even though you can always erase your mark if you have used a pencil (number 2 or similar), any mark that has not been completely erased could be read by the machine. Therefore, we advice you to first mark your selected answers in the exam and to use only the last ten minutes or so from the time assigned to the multiple choice questions part of the exam to copy them into the code sheet.
3. In the multiple choice questions part of the exam there is always **only one correct answer** for every question. Every question correctly answered is worth 1 point, while each question incorrectly answered will not penalize your grade at all. Questions that have not been answered do not penalize your grade in any form.
4. The exam has four numbered sheets, going from 0.1 to 0.4. Please make sure that you have all sheets and contact your professor if this is not the case. There are different exam types. This exam is of type 0. Mark a 0 in the column labelled with I in your code sheet, just as it is illustrated in the example.
5. The maximum final grade is 15 points
7. Please fill in your personal information in the appropriate places in the code sheet.

Example:

$\underbrace{12545}$ PEREZ, Ernesto Exam type $\underbrace{0}$ Resit





MULTIPLE CHOICE QUESTIONS (Time: 50 minutes)

1. FREE-QUESTION. The capital of Spain is:

   (A) Paris (B) Sebastopol (C) Madrid (D) London (E) Pekin

Questions 2 and 3 refer to the following exercise:

A r.s. of size $n = 17$ has been taken from a population having a normal distribution with unknown variance, providing the following results: $\overline{x} = 4.9$ and $s^2 = 4$.

2. The 95% confidence interval for the population mean is:

   (A) $(3.84, 5.96)$ (B) $(4.08, 5.72)$ (C) $(3.52, 6.28)$ (D) $(4.23, 5.57)$ (E) $(3.92, 5.88)$

3. We wish to test the null hypothesis $H_0 : m \leq 4.5$ against the alternative hypothesis $H_1 : m > 4.5$. At the 5% significance level, and based on the information provided in the sample, the decision will be:

   (A) Do not reject H_0 (B) No decision can be adopted (C) Reject H_0
   (D) - (E) -

Questions 4 to 6 refer to the following exercise:

A construction firm buys ten water pipes made of material type A and ten made of material type B. It is assumed that the duration of such water pipes follows a normal distribution, and that water pipes of different type are independent from each other. From the above sample the firm was able to compute the sample mean and their corresponding sample standard deviations for the water pipes' duration, obtaining that: $\overline{x}_A = 1362.5$, $\overline{x}_B = 1225.8$, $s_A = 202.46$ y $s_B = 256.49$.

4. The 0.90 confidence interval for the ratio of variances, σ_A^2/σ_B^2 is,:

   (A) $(0.1959, 1.9814)$ (B) $(0.3000, 8.5862)$ (C) $(0.5088, 4.3355)$
   (D) $(0.1000, 0.9000)$ (E) $(0.6577, 3.9160)$

5. We wish to test the null hypothesis that the variances for the durations for both types of water pipes are the same. At the 10% significance level, the decision will be:

   (A) Do not reject H_0 (B) No decision can be adopted (C) Reject H_0
   (D) - (E) -

6. The 0.90 confidence interval for the difference of the mean durations for the two types of water pipes, $m_A - m_B$, is:

   (A) (136.7 ± 216.99) (B) (136.7 ± 137.43) (C) (136.7 ± 297.59)
   (D) (136.7 ± 169.46) (E) (136.7 ± 188.44)

Questions 7 and 8 refer to the following exercise:

The number of calls per minute in a telephone switchboard follows a Poisson distribution with parameter λ. At the 5% significance level, we wish to test the null hypothesis $H_0 : \lambda = 5$ against the alternative hypothesis $H_1 : \lambda > 5$ and, to be able to do it, a random sample of one minute is taken.

7. If during that minute, 8 calls were received by the phone switchboard, the decision will be:

   (A) Do not reject H_0 (B) No decision can be adopted (C) Reject H_0 (D) - (E) -

8. The power of the test for $\lambda = 7$ is:

   (A) 0.8305 (B) 0.7291 (C) 0.0985 (D) 0.2709 (E) 0.1695

Questions 9 and 10 refer to the following exercise:

A r.s. of size 18 from a normal population has been taken, providing the following results: $\overline{x} = 26.82$ and $s^2 = 61.33$.

9. A 95% confidence interval for the population variance is given by:

   (A) $(40.0, 127.33)$ (B) $(36.55, 146.02)$ (C) $(35.61, 152.16)$ (D) $(30.2, 150.4)$ (E) $(31.1, 110.12)$

10. At the 5% significance level, can we reject the null hypothesis $H_0 : \sigma^2 = 50$ againts the alternative hypothesis $H_1 : \sigma^2 \neq 50$?

    (A) Yes (B) No (C) No decision can be adopted (D) (E)

11. We wish to study the difference between the proportions of individuals that favor a new rule The City Hall is planning to implement in two different neighborhoods, whose views can be considered as independent from each other. In the first neighborhood, for a sample of $n_1 = 700$ individuals, $z_1 = 300$ were in favor of it. In the second neighborhood, for a sample of $n_2 = 900$ individuals, $z_2 = 500$ were in favor of it. If, at the 5% significance level, we wish to test the null hypothesis of equal proportions of individuals in favor of the new rule for the two neighborhoods, the decision is:

    (A) Do not reject H_0 (B) No decision can be adopted (C) Reject H_0 (D) (E)

Questions 12 and 13 refer to the following exercise:

We wish to test if benefits (in millions of euros) for firms in a given industry follow a normal distribution with mean 10 and variance 4. In order to do so, we have recorded the benefits for 100 firms, so that 30 of them have benefits smaller than 8; 50 of them have benefits between 8 and 13, and the remaining 20 firms have benefits larger than 13.

12. If benefits follow a $N(10, \sigma^2 = 4)$ distribution, the asymptotic distribution of the test statistic used to perform this test will be:

    (A) χ^2_3 (B) χ^2_1 (C) χ^2_{99} (D) χ^2_{100} (E) χ^2_2

13. If the hypothesis we wish to test holds, approximately how many firms having benefits smaller than 8 do we expect to observe in the sample?

    (A) 25 (B) 16 (C) 84 (D) 0 (E) 38

Questions 14 and 15 refer to the following exercise:

In a study about entertainment, we wish to estimate the monthly mean expenses in euros used to go to the movies. In order to do so, the population has been divided into two different age groups. The first age group is that of individuals younger than 35 years, and the second one is that of individuals with ages larger than or equal to 35 years. The corresponding population sizes for these age groups are $N_1 = 20000$, $N_2 = 30000$, and the quasivariances for the two age strata are 400 and 100, respectively. It has been decided to take a stratified random sample, with a total sample size of $n = 1000$.

14. If strata sample sizes are obtained by proportional allocation, the corresponding sample sizes for the two groups will be:

(A) $n_1 = 500$, $n_2 = 500$ (B) $n_1 = 800$, $n_2 = 200$ (C) $n_1 = 727$, $n_2 = 273$
(D) $n_1 = 571$, $n_2 = 429$ (E) $n_1 = 400$, $n_2 = 600$

15. If strata sample sizes are obtained by n-optimal allocation, the corresponding sample sizes for the two groups will be::

(A) $n_1 = 400$, $n_2 = 600$ (B) $n_1 = 800$, $n_2 = 200$ (C) $n_1 = 500$, $n_2 = 500$
(D) $n_1 = 571$, $n_2 = 429$ (E) $n_1 = 727$, $n_2 = 273$

SOLUTIONS

1: C	6: E	11: C
2: A	7: A	12: E
3: A	8: E	13: B
4: A	9: B	14: E
5: A	10: B	15: D