INSTRUCTIONS

1. The quiz 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 quiz has three numbered sheets, going from 0.1 to 0.3. 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. **You will need to obtain 11 points to pass this quiz**.

7. Please fill in your personal information in the appropriate places in the code sheet.

Example:

        12545   PEREZ, Ernesto   Exam type 0   Resit

MULTIPLE CHOICE QUESTIONS (Time: 60 minutes)

1. The capital of Spain is:

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

Questions 2 and 3 refer to the following exercise:

The probability that an individual changes his mobile phone company over a period of one year is 0.15. We select 5 individuals at random.

2. The probability that 2 of them have changed their mobile phone company over the past year is:

    (A) 0.0244   (B) 0.1382   (C) All false   (D) 0.0138   (E) 0.0024

3. Let X be the random variable that counts the number of individuals, among the previously selected 5 individuals, that have changed their mobile phone company over the past year. The standard deviation of the random variable X is:

    (A) 0.6375   (B) 0.7984   (C) 0.75   (D) 0.3354   (E) 0.1125

4. The probability that an individual changes its mp4 model device over a period of two years is 0.7. If 20 individuals are randomly selected, the probability that more than 17 of them change their mp4 model device over a period of two years is:

    (A) 0.0145   (B) 0.9645   (C) 0.8203   (D) 0.0355   (E) 0.1659

Questions 5 to 7 refer to the following exercise:

It is known that a given illness affects 90 out of 100,000 inhabitants. We assume independence between the different inhabitants affected by this illness.

5. In a population of 1,000 inhabitants, the approximate probability that at least 4 inhabitants will be affected by this illness is:

    (A) 0.0212   (B) 0.9788   (C) 0.0115   (D) 0.9977   (E) 0.0023

6. In that same population of 1,000 inhabitants, the most likely number of infected inhabitants is:

    (A) 1   (B) 0.9   (C) 0   (D) 0.09   (E) 9

7. If we consider another population having now 100,000 inhabitants, the approximate probability that at most 70 inhabitants will be affected by this illness is:

    (A) 0.0154   (B) 0.0197   (C) 0.9803   (D) 0.0457   (E) 0.9821

Questions 8 to 11 refer to the following exercise:

The number of clients per minute served by a cashier in a given supermarket is a random variable having a Poisson distribution with mean 0.15.

8. The probability that in a given minute 2 people are served by this supermarket cashier is:

    (A) 0.0194   (B) 0.0646   (C) 0.3228   (D) 0.075   (E) 0.0097

9. The probability, rounded up to one decimal place, that in a given hour more than 10 people are served by this supermarket cashier is:

   (A) 0.8   (B) 0.2   (C) 0.3   (D) 0.7   (E) 0.4

10. If the supermarket has 10 cashiers, the approximate probability that in a given hour at least 4 of them serve more than 10 people is:

   (A) 0.1503   (B) 0.3504   (C) 0.2001   (D) 0.2668   (E) 0.6496

11. The probability that in a regular working day of 8 hours at most 80 people are served by this supermarket cashier is, approximately:

   (A) 0.8413   (B) 0.9382   (C) 0.8106   (D) 0.1587   (E) 0.1984

12. The mean and standard deviation of the time a bus takes to complete its route are **20** and **5 minutes**, respectively. We assume independence between the different bus routes. If during a given month we complete this bus route 80 times, the approximate probability that we spend less than **25 hours** in the bus is:

   (A) 0.6026   (B) 0.9875   (C) 0.2012   (D) 0.0125   (E) 0.3974

13. Let $\{X_n\}_{n\in\mathcal{N}}$ be a sequence of random variables having a $U\left(0, 2 - \frac{1}{n+1}\right)$ distribution. The sequence will converge:

   (A) In distribution to $X = 2$

   (B) In distribution to a $U(0,2)$ random variable

   (C) In distribution to $X = 1$

   (D) In distribution to a $U(0,1)$ random variable

   (E) All false

14. Let $\{X_n\}_{n\in\mathcal{N}}$ be a sequence of random variables with probability mass function given by:

$$P_n(x) = \begin{cases} \frac{1}{n} & \text{if } x = 0 \\ 1 - \frac{2}{n} & \text{if } x = 2 \\ \frac{1}{n} & \text{if } x = 4 \end{cases}$$

   The sequence will converge:

   (A) Only in distribution to $X = 0$

   (B) In probability, distribution and quadratic mean to $X = 2$

   (C) Only in probability to $X = 4$

   (D) Only in distribution to $X = 2$

   (E) Only in distribution and probability to $X = 2$

15. Let $\{X_n\}_{n\in N}$ be a sequence of random variables such that:

$$P(X_n = 0) = 1 - \frac{1}{n} \qquad \text{and} \qquad P(X_n = n^3) = \frac{1}{n}$$

   Then, we have that:

   (A) $X_n \xrightarrow{\text{q}} 0$ (B) $X_n \xrightarrow{\text{d}} 0$ but $X_n \xrightarrow{\text{P}}\!\!\!\!/\ 0$ (C) $X_n \xrightarrow{\text{P}} 0$ but $X_n \xrightarrow{\text{q}}\!\!\!\!/\ 0$

   (D) All false   (E) $E(X_n) = 1$