5. LESSON: PROPOSED EXERCISES

To solve the following proposed exercises, the theory corresponding to lesson 5, series of videos provided in *readings and other resources* document as well as the examples shown in the solved exercises of the same lesson will be very helpful.

1. The telephone line of the vice-chancellor's office of a university is occupied 60% of the time. Assuming that calls to the vice-chancellor's office are independent:
    a) If a call is made, which is the probability that the telephone line is not occupied?
    b) If 10 calls are made, which is the probability that the line is occupied in at most three calls?
    c) If 25 calls are made one morning, which is the probability that the line is not occupied on 10 occasions?

Solution: a) 0.4; b) 0.0548; c) 0.1612.

2. In a warehouse of a French factory there are 90 refrigerators. Of these, 12 are the refrigerators with ice formation module. Calculate:
    a) If a customer buys 5 refrigerators the probability that at least one has the ice formation module.
    b) If 60 refrigerators have to be sent to another warehouse, the probability that a tenth of the refrigerators have ice module.
    c) If 10 refrigerators were introduced in a truck, which is the probability that the truck is full of refrigerators without ice formation module?

Solution: a) 0.5196; b) 0.1085; c) 0.2200.

3. Every day in an airport, on average 12% of the planes leave the runway late. If there are 125 scheduled flights in one day, calculate:
    a) The probability that 5 flights have late departure.
    b) The probability that a maximum of 10 flights and a minimum of 5 leave the runway late.
    c) In the airport control tower, if there is a director per working day (8 hours), the probability that in the working day of a director a maximum of 3 flights leave the runway late.

Solution: a) 0.0019; b) 0.1176; c) 0.2650.

4. The lifespan of an electronic device, measured in weeks, is a random variable that follows an exponential distribution in which $\lambda=0.002$. Calculate the probability that the lifespan of the electronic device is:
    a) More than 100 weeks.
    b) A maximum of 30 weeks.
    c) Between 30 and 100 weeks.

Solution: a) 0.8187; b) 0.0582; c) 0.1230.

5. The length in mm of the pieces produced by a factory is a random variable that follows a normal distribution. The mean value is 30 and the standard deviation is 6. By selecting a piece randomly, calculate the probability that:
    a) Its length is greater than 17 mm.
    b) Its length is less than 22 mm.
    c) Its length is between 32 and 41 mm.
    d) For what central values the probability between them is 75%.

Solution: a) 0.9849; b) 0.0912; c) 0.3361; d) 23.1 and 36.9.

6. The lengths of the pieces manufactured in A company follow a normal distribution in cm, with a mean value of 72 and a standard deviation of 8. On the other hand, the lengths of the pieces made in B company follow a normal distribution in cm, where the mean is 60. Taking into account that the length of 10% of the pieces made in B company is greater than 72, calculate:
    a) The standard deviation of pieces in B company.
    b) Probability that the length of a piece from A company is greater than 75.
    c) Probability that the length of a piece from A company is less than 60.
    d) What is more probable, that the length of a piece from A company is less than 64 or that the length of a piece from B company is greater than 55?

Solution: a) 9.3636; b) 0.3538; c) 0.0668; d) It is more probable that a piece from B company is greater than 55.