SELF-EVALUATION

1. The random variable can take the following values: {2,3,7,8,10}. Knowing that p(2)=p(3)=p(7)=1/4 and p(8)=p(10)=1/8, calculate the values of asymmetry and kurtosis, indicating the shape of the distribution.

2. Let be the life expectancy of radio-isotope a random variable with the following density function:

$$f(x)=\begin{cases} ke^{-2x} & x>0 \\ 0 & x\leq 0 \end{cases}$$

   a) Calculate the value of k to make $f(x)$ a density function.

   b) Obtain the distribution function of the continuous random variable.

   c) Calculate the characteristic function of the distribution.

   d) Calculate the generating function of moments of the distribution.

   e) Calculate the mean and variance of the distribution using the generating function of moments.

3. Different trials on lindane are being conducted in a Swiss chemistry laboratory. It is about measuring the resistance of a certain type of bacteria to lindane. It is known that 0.5% of these bacteria have no resistance to lindane. If in a given medium there is a sample of 20,000 bacteria, calculate:

   a) The probability that the number of bacteria that have no resistance to lindane is greater than 2 and less than 8.

   b) The probability that there are 10 bacteria that have no resistance to antibiotics.

4. A company looking for employees is selecting candidates. The human resources technician carries out a study to the candidates. The average of the score obtained in the study is 60 and the typical deviation of 10.

   For candidates to pass to the next phase of the selection it is necessary to obtain a mark between 55 and 80 points. Knowing that the score obtained by the candidates follows a normal distribution,

   a) What percentage of candidates will go to the next selection phase?

   b) What percentage of candidates has obtained more than 90 points?

   c) What percentage of candidates has obtained less than 50 points?

d) What are the two central values of the scores we have to set so that among them there are 50% of the candidates?

5. A complex electronic system requires a specific component in its assembly. These components are purchased in large lots and are tested sequentially to find the first defective component. The percentage of defective components is 5%. Determine using R Studio:

   a) The probability that the first defective component found is one of the first 4 components tested.

   b) The probability that the first defective component found is between the first 4 and at most the first 10 components tested.