Seminar 1
Probabilities
DEDP

1. Let A be a continuous r.v. with distribution $\mathcal{U}\ [0, 6]$

    a. Draw the PDF of A
    b. Compute the probability that $A > 1$
    c. Compute the probability that $A \in (0, 2)$
    d. Draw the CDF function and write its mathematical expression
    e. What is the distribution of $B = A - 2$?
    f. What is the distribution of $C = 3 * A$?

2. Let A be a r.v. with distribution $\mathcal{N}\ (\mu = 1, \sigma^2 = 20)$.

    a. Compute the probability that $A \in [2, 4]$
    b. What is the distribution of $B = A - 2$?
    c. What is the maximum value of $w_A(x)$ and for what x is it reached?
    d. (**) What is the distribution of $C = 3 * A$?

3. Knowing that the IQ score follows a distribution $\mathcal{N}\ (\mu = 100, \sigma = 15)$, find:

    a. The probability that a random person has IQ score > 130
    b. If the total population is 8 billion, how many people have IQ smaller than 75
    c. (**) What is the minimum IQ needed in order to be among the top 2%?

4. Let A be a **discrete** random variable with possible values $\{0, 1, 2, \dots 10\}$, all values having equal probability.

    a. Draw the distribution (PMF) of A
    b. Find the probability that $A \in [3, 7]$
    c. What is the probability that A is an odd number?

5. Compute the probability that three r.v. X, Y and Z i.i.d. $\mathcal{N}(-1, 1)$ are all positive simultaneously

6. Compute the probability that at least one of three r.v. X, Y and Z i.i.d. $\mathcal{N}(-1, 1)$ is positive.

7. Compute the average value, the average squared value, and the variance for a continuous random variable with the uniform distribution $\mathcal{U}[2, 10]$.