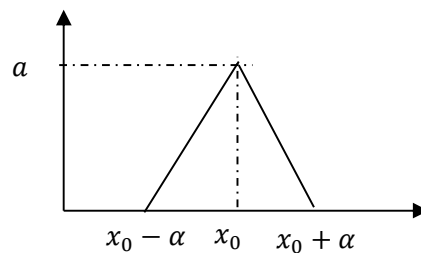# Tutorial 2

Exercise 1:

- Test if the function reported in the figure below is a probability density function.
- Compute the distribution function and plot it.

Exercise 2:

Suppose the height of clouds above the ground at some location is a Gaussian random variable X with mean and variance equal to 1830 m and 460 m, respectively.

Find the probability that clouds will be higher than 2750 m.

Exercise 3

Plot the binomial density and distribution functions for *N*=6 and *p*=0.25.

Exercise 4

Let us consider a box containing 5 red, 35 green and 60 blue balls. Let us define a discrete random variable X to have values $x_1 = 1, x_2 = 2, and\ x_3 = 3$ when a red or green or blue ball is selected. Determine and plot the probability density and distribution functions.

Exercise 5:

A discrete random variable X have possible values $x_i = i^2$ with $i = 1, 2, 3$. which occur with probabilities 0.4, 0.1, and 0.5, respectively.
Find the first and second moments in addition to the variance.

Exercise 6:

The characteristic function for a Gaussian random variable X having mean value of 0 is:

$$\emptyset_X(\omega) = \exp\left(-\sigma_x^2 \omega^2 / 2\right)$$

Find the moments of X using $\varphi_X(\omega)$.

Exercise 7:

Let X be random variable with probability density function

$$f_X(x) = \begin{cases} \dfrac{x}{2}, & 0 < x \le 2 \\ 0 & otherwise \end{cases}$$

Find the pdf of $Y = T(X) = e^{-X}$.