Matrícula (First-name Last-name) **CK0255/TIP8421: Homework C**

Exercise A.1. Let X be a random variable whose PDF is

$$f_X(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0, & \text{elsewhere} \end{cases}.$$

(1) Compute $E(1/X)$.

(2) Determine and plot the PDF and the CDF of $Y = 1/X$.

(3) Compute $E(Y)$ and compare it with $E(1/X)$.

Exercise A.2. Let X be a random variable whose PDF is

$$f_X(x) = \begin{cases} 3x^2, & 0 < x < 1 \\ 0, & \text{elsewhere} \end{cases}.$$

(1) Compute $E(X^3)$.

(2) Determine and plot the PDF and the CDF of $Y = X^3$.

(3) Compute $E(Y)$ and compare it with $E(X^3)$.

Exercise A.3. Let $p_X(x) = (1/2)^x$ for $x, 1, 2, 3, \ldots$ and zero elsewhere be the PMF of the random variable X.

(1) Find the mean and the variance of X.

(2) Find the MGF of X.

Exercise A.4. Let X be a random variable with mean μ and standard deviation σ. Show that

$$E\Big(\frac{X-\mu}{\sigma}\Big) = 0 \quad (1)$$

$$E\Big[\Big(\frac{X-\mu}{\sigma}\Big)^2\Big] = 1 \quad (2)$$

Exercise A.5. Let X be a RV whose moment generating function is $M(t) = (1-t)^{-3}$, $t < 1$.

- Find the moments of the distribution of X. [*Hint*] Use Maclaurin's expansions.