Evaluation Test 1 – September 24th – 30 mn

You must **explain** *your calculations, the result alone is not enough*

Ex1 Suppose that $X_1, X_2, \ldots, X_n$ is an i.i.d. sample with mean θ and variance θ^2.

1. What are $\mathrm{E}(2X_i + 1)$ and $\mathrm{Var}(2X_i + 1)$?
2. Find the bias, standard error and MSE of the estimator $\widehat{\theta} = \overline{X}$.

Ex2 Suppose that X is Uniform$(0, 2)$ with PDF $f(x) = \dfrac{1}{2} 1_{0 \leq x \leq 2}$.

3. Find the CDF of X.
4. What is the median of X ? the 0.1-quantile of X ?

Ex3 Suppose that $X_1, X_2, \ldots, X_n$ is an i.i.d. sample from the Pareto law with PDF $f(x) = \dfrac{\theta}{x^{\theta+1}}$, $x > 1$, $\theta > 1$. We have $\mathrm{E}(X_i) = \dfrac{\theta}{\theta - 1}$.

5. Find the method of moments estimator of θ.