Report 1

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Computer Simulations of Stochastic Processes

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1. Compare two estimators of α parameter we introduced in the laboratories:

   (a) Based on the ECDF;

   (b) Based on the characteristic function (CF);

   To do that, show:

   (i) a plot of ECDF/CF with the fitted line of the appropriate form.

   (ii) distribution of estimated $\widehat{\alpha}$'s from each method (based on Monte Carlo simulations)

   (iii) Calculate MSE and MAE (mean square error, mean absolute errors) of the estimators.

   For (i) and (ii) consider one set of parameters $(\alpha, \beta, \gamma, \delta)$, for (iii) present a two-dimensional heatmap/contourplot depending on α and β. Check the dependence on the other parameters (γ, δ). Assess which estimator is better (or, perhaps, does it depend on the parameters). Discuss dependence on the sample length.

Base your Monte Carlo simulations on, e.g., 1000 samples.
In your report include codes (Jupyter notebook is preferable, but not necessary), discussions and some conclusions. Remember to also send it to me by 17.04.