

In the name of God

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STOCHASTIC PROCESSES

Exercise Set 1

(Due Date: 1400/12/06)

1. Error analysis and propagation: Using the input file, write a proper program file to do following tasks:

- A** : Read input data file which contains more than 10^6 one-column data. and spilt it to 100 input files.
- B** : Making directories and send each data sets to corresponding directory.
- C** : Compute mean, variance and mean standard deviation of each data sets. And write them in a file which contains the label of data, mean, standard deviation and mean standard deviation. Finally plot them.
- D** : Compute $p_i(x)$ as a function of x for each sets. To this end, use $W(x, q)$ for $q = 0$ and $q = 1$.
- E** : Smooth the computed $p_i(x)$ in the previous question with a Gaussian kernel with a typical variance and finally plot them.
- F** : Compute $\sigma_m(p(x))$. Plot $p(x)$ versus x and show its error-bar for 5 sets of data.

2. Different Probability density functions:

- A** : For A binomial distribution, compute $\langle k \rangle$, $\langle (k - \langle k \rangle)^2 \rangle$, $\langle (k - \langle k \rangle)^3 \rangle$ and show $P(k)$ for binomial is normalized.
- B** : For A Poisson distribution, compute $\langle k \rangle$, $\langle (k - \langle k \rangle)^2 \rangle$, $\langle (k - \langle k \rangle)^3 \rangle$ and show $P(k)$ for binomial is normalized. Also show:

$$P_{poisson}(k) = \lim_{N \rightarrow \infty} P_{binomial}(k)$$

- C** : Show $P_{Gaussian}(k) = \lim_{\lambda \rightarrow \infty} P_{poisson}(k)$

Good luck, Movahed
