CHEM/PHY 598

Info: You can work in groups, but all solutions must be written up independently. Many of the written problems –which are not assigned directly from the class textbook– are taken from a variety of other textbooks/papers. If any question requires a computational component, provide your written answer on one sheet, then the printout of your Mathematica notebook only for that problem on separate sheets following your write-up for that problem. Then repeat for each problem. i.e. do **not** staple a Mathematica notebook printout for all problems at the end of your problem set. **Only codes that are commented *at every step* and *whose logic can be easily followed* will be graded**.

DUE: **Tuesday** March 17th. To be handed in within the first five minutes of class.

Problem 1: Change-point algorithm

Implement the BIC-based change-point method for the simple case of a Gaussian likelihood with identical standard deviation assumed for all data points. In other words, begin by generating synthetic data assuming discrete steps in your data where you have pre-specified by hand the means of those steps in the signal, $\boldsymbol{\mu}_{1:K}$, and σ.

Then, implement the change-point method in order to learn the means, $\boldsymbol{\mu}_{1:K}$, and locations, $\mathbf{j}$, of your steps. Compare your parameter estimates from your method to the theoretical values you used to generate your data.