PHYS 598 SDA RECITATION 9 - PROBLEM SET

1. Mode-n unfolding: Let $t \in V_1 \otimes \ldots \otimes V_p$, where $\dim(V_i) = I_i$. Then, the mode-n unfolding of t is a matrix $\mathfrak{t}_{(n)}$ of dimension $I_n \times (\prod_{i \neq n} I_i)$ obtained by organizing the mode-n fibers of t along the columns. The tensor component $t^{i_1 \ldots i_p}$ is mapped to the i_n-th row and j-th column of $\mathfrak{t}(n)$, where

$$j = 1 + \sum_{\ell=1, \ell \neq n}^{p} [(i_\ell - 1) J_\ell]$$

and J_ℓ is picked based on the index ℓ relative to n. *(Check course notes for the explicit values of J_ℓ.)*

Your task : first, check out page 7-8 of this PDF from Carnegie Mellon for a pictorial understanding. Then, convince yourself of the examples given on Jean Kossaifi's gitbub page.

2. Monte Carlo sampling (from analytic PDFs): We shall first go through the notes in this Berkeley PDF due to Jasmina Vujic. Having done that, go through the worked-out problems in this PDF from Stanford. *(We are technically challenged without doing explicit programing, but these solutions will give you an idea of how such problems are to be solved. In principle, you should go through all the problem sets here, if you have time.)*