1. Write down the EM algorithm (i.e. the E-step and M-step) to get Maximum Likelihood Estimates in a Poisson Mixture Model (this is useful to cluster features where counts are measured). You should assume that features are independent in each mixture component. Be as complete as possible in showing your derivation.

For reference, the probability mass function of the Poisson distribution is:

\[ p(x; \lambda) = \frac{\lambda^x}{x!} \exp\{-\lambda\} \]

and for a \( D \)-dimensional multivariate Poisson with independent features:

\[ p(x; \lambda) = \prod_{d=1}^{D} \frac{\lambda_d^{x_d}}{x_d!} \exp\{-\lambda_d\} \]