Homework 1 (Due date: Thursday October 1, 11:59pm)

Q1. Consider a Geiger counter in a nuclear power plant that measure the number of radiation counts. We observe n readings from the counter and denote them as $x_1, x_2, \cdots, x_n$. It is known that the number of radiation counts follows a Poisson distribution with parameter λ.

$$P(x; \lambda) = \frac{\lambda^x e^{-\lambda}}{x!}, x = 0,1,2, \cdots$$

Find the MLE estimate of λ based on the observed values $x_1, x_2, \cdots, x_n$.

Q2. Consider the following 20 data samples generated from a Poisson distribution:

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}	x_{20}
3	1	2	1	2	1	0	2	1	0	5	6	3	2	4	4	0	5	5	3

Plot the MLE estimate for the parameter λ as a function of the number of samples (i.e., plot the MLE estimate for λ when you consider only x_1, only x_1 and x_2, only x_1, x_2 and x_3, and so on till you consider all 20 data points).