# Classical and Quantum Optics

Assignment-2 Answers

Varghese Reji

## Problem 1

The python code to solve this question is given here.

To create the upper confidence limit, we use the formula,

$$P(x < x_1|\mu) = 1 - \alpha \tag{1}$$

and for central interval, we use

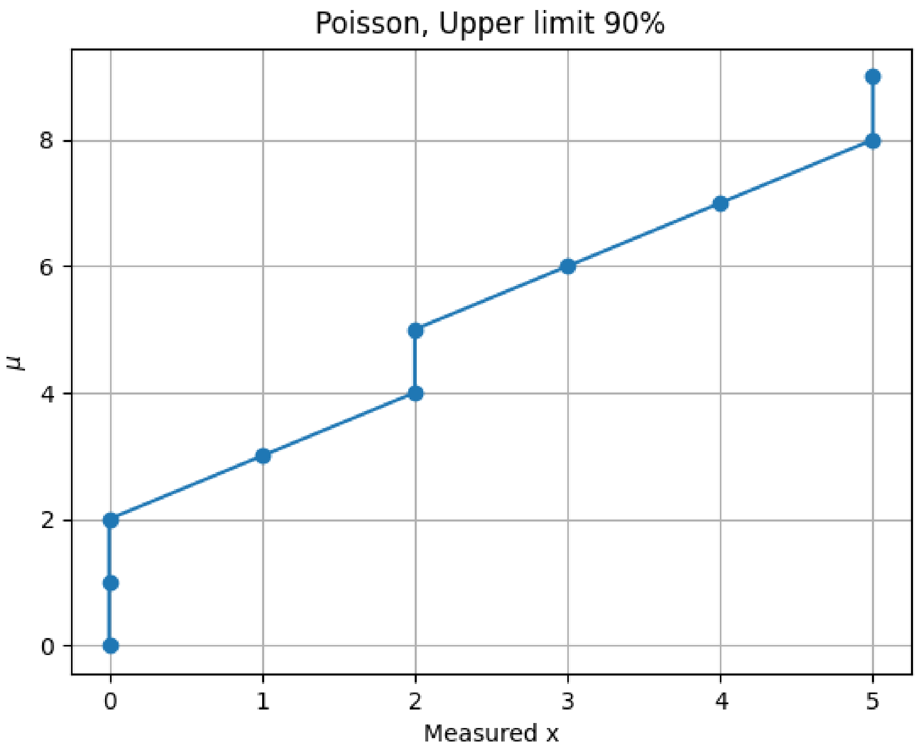
$$P(x < x_1|mu) = P(x > x_2) = \frac{(1-\alpha)}{2} \tag{2}$$

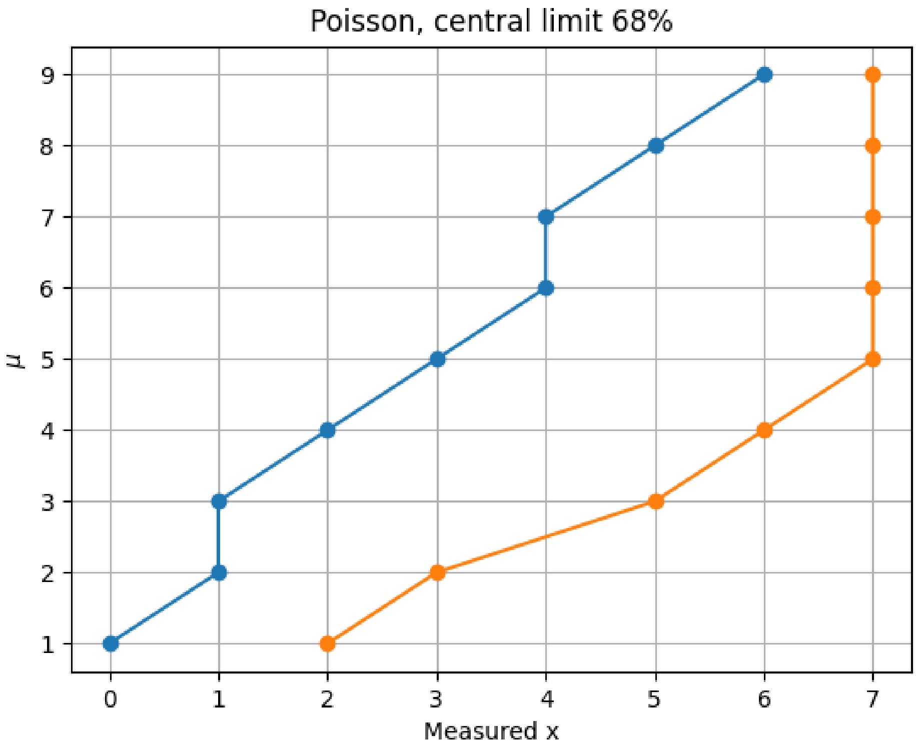
We will take the central interval 68% and upper limit 90%.

**(a)** Poisson Discrete random variable.

$$P(x|\mu) = \frac{\mu^x}{x!}e^{-\mu} \tag{3}$$

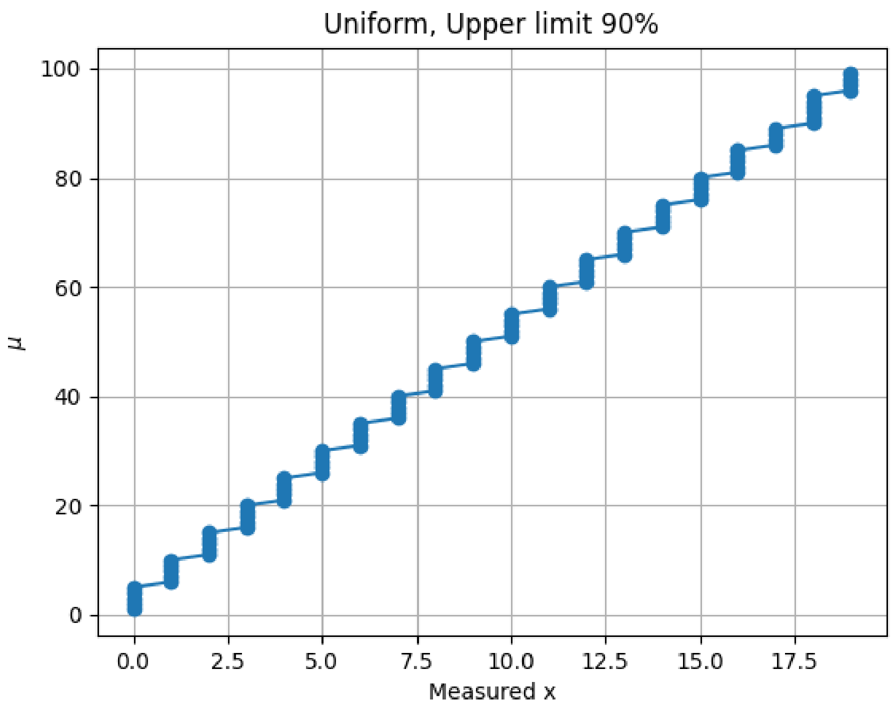
The plots are shown below.

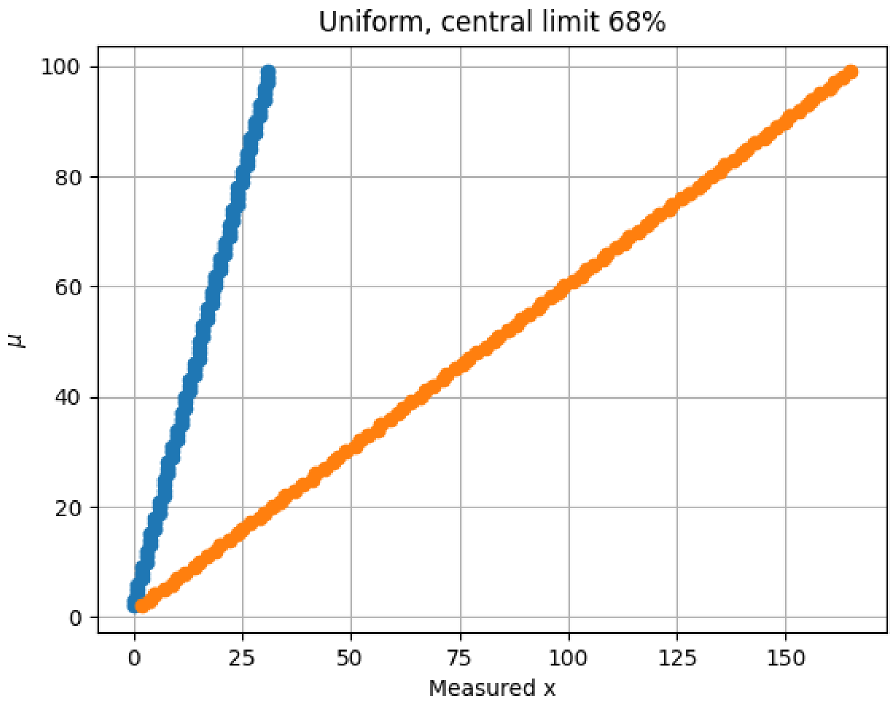





**(b)** Uniform distribution. Here, $k = 2\mu$.

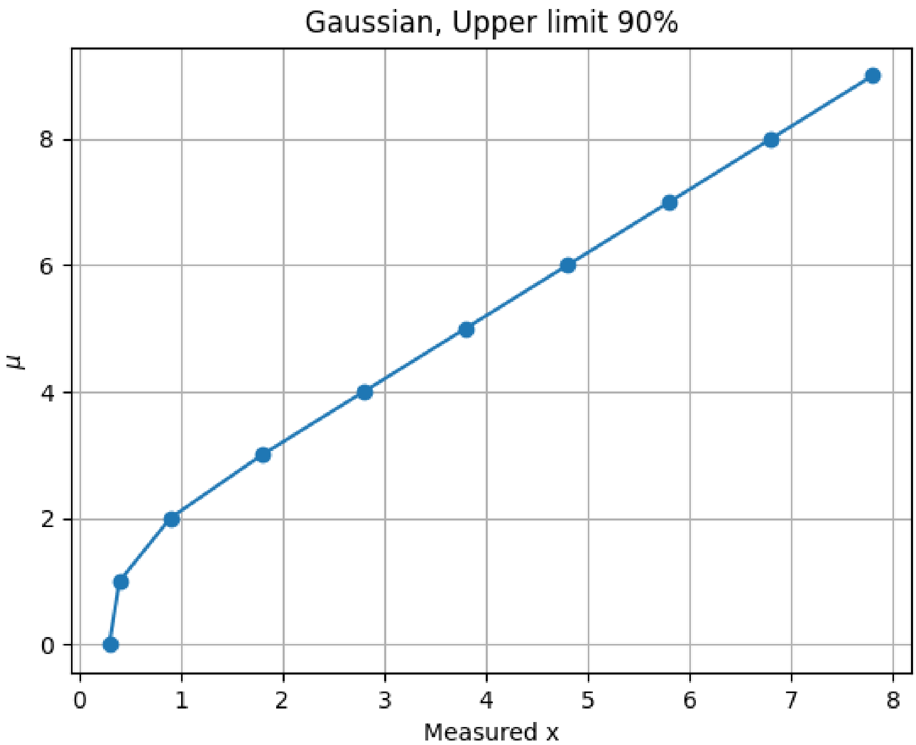
Here, I took $k = 100$. Plots are shown here.

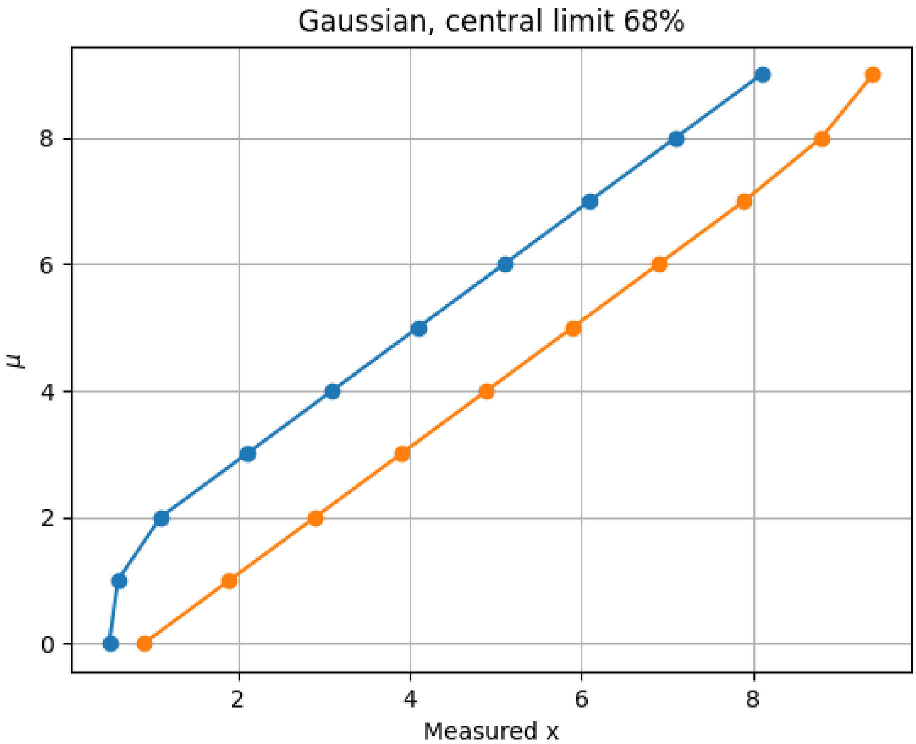





**(c)** Gaussian function with $\sigma = 1$.

$$P(x|\mu) = \frac{1}{\sqrt{2\pi}} \exp\left(\frac{(x-\mu)^2}{2}\right) \tag{4}$$




Gaussian, central limit 68%
μ
Measured x
0
2
4
6
8
2
4
6
8