

1. With pen and paper or LaTeX, derive the maximum likelihood estimator for the mean μ of the normal distribution, $N(\mu, \sigma^2 = 4)$. Show your work.

$$f(x|\mu, \sigma) = (2\pi\sigma^2)^{-1/2} \exp\left(\frac{-(x - \mu)^2}{2\sigma^2}\right).$$

2. With **R**, generate data from $N(\mu = 5, \sigma^2 = 4)$, and then use `optim` to estimate μ and σ via the log-likelihood function for the normal distribution. Show your work.