Problem Set #2

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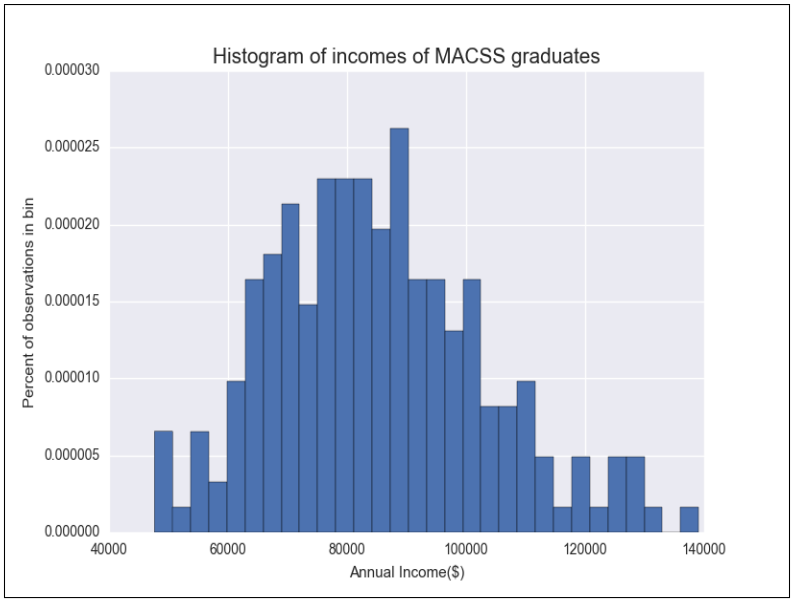
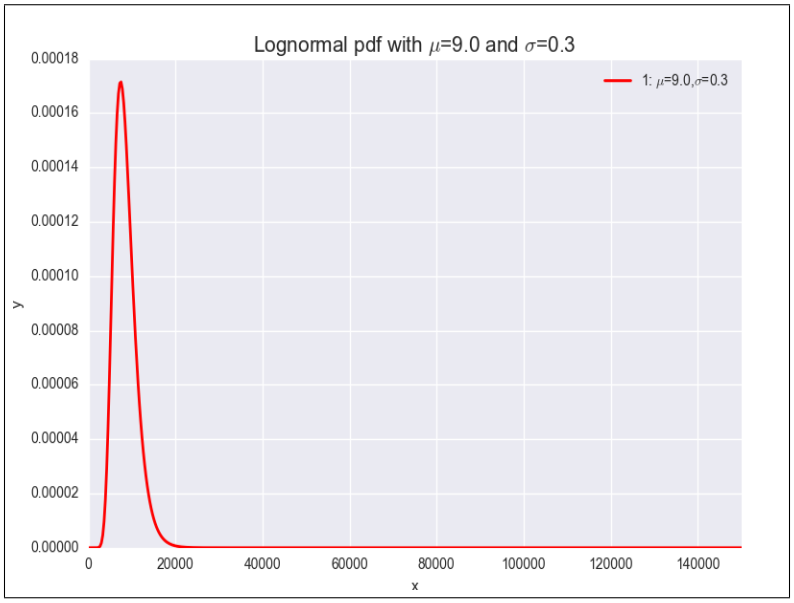
Problem 1

Part (a).

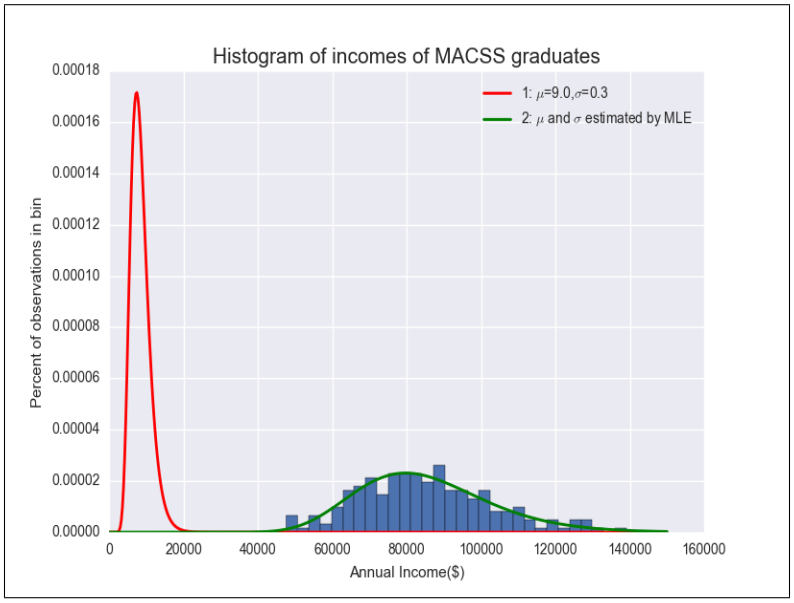


Part (b). The log likelihood value for this parameterization of the distribution given this data is -8298.64.



Part (c). MLE estimate of μ is 11.33, and MLE estimate of σ is 0.21. The log-likelihood value of MLE estimate is -2239.53. The variance-covariance matrix is

$$\begin{bmatrix} 2.24e-04 & 1.45e-07 \\ 1.45e-07 & 1.12e-04 \end{bmatrix}$$



Part (d). According to the result of chi squared test, the probability that the data in incomes.txt came from the distribution in part (b) is 0.

Part (e). Probability that you will earn more than $\$100,000$ is 19.58%.
Probability that you will earn less than $\$75,000$ is 30.77%.

Problem 2
Part (a).
MLE estimate of β_0 is 0.2512.
MLE estimate of β_1 is 0.0129.
MLE estimate of β_2 is 0.4007.
MLE estimate of β_3 is -0.009.
The log-likelihood value of MLE estimate is 459.05.
The variance-covariance matrix is

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Part (b). According to the chi squared test with 5 degrees of freedom, the p value is 0.0, which shows that the probability that age, number of children, and average winter temperature have no effect on the number of sick days is 0.