Problem Set #2

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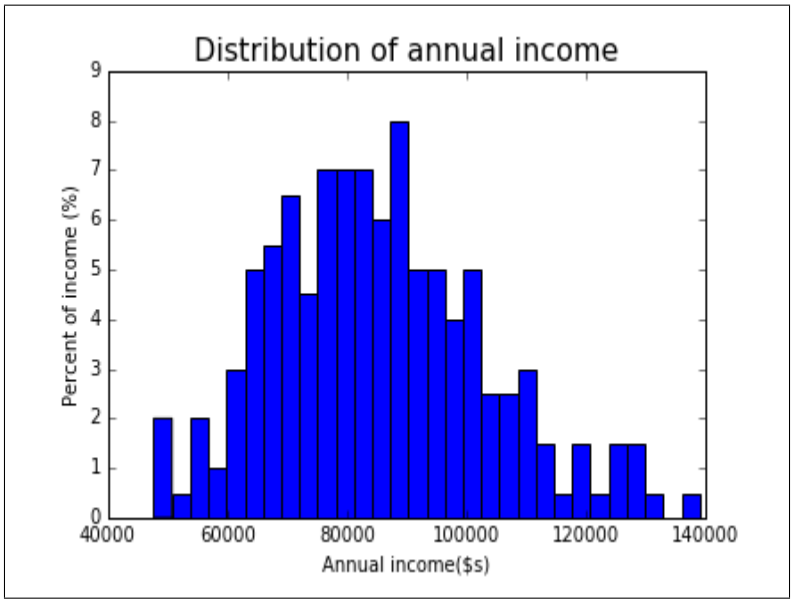
Excercise 1

Part (a).

Figure 1: Distribution of Annul Income



Part (b).

The log likelihood for this parameterization and data is -8298.64.

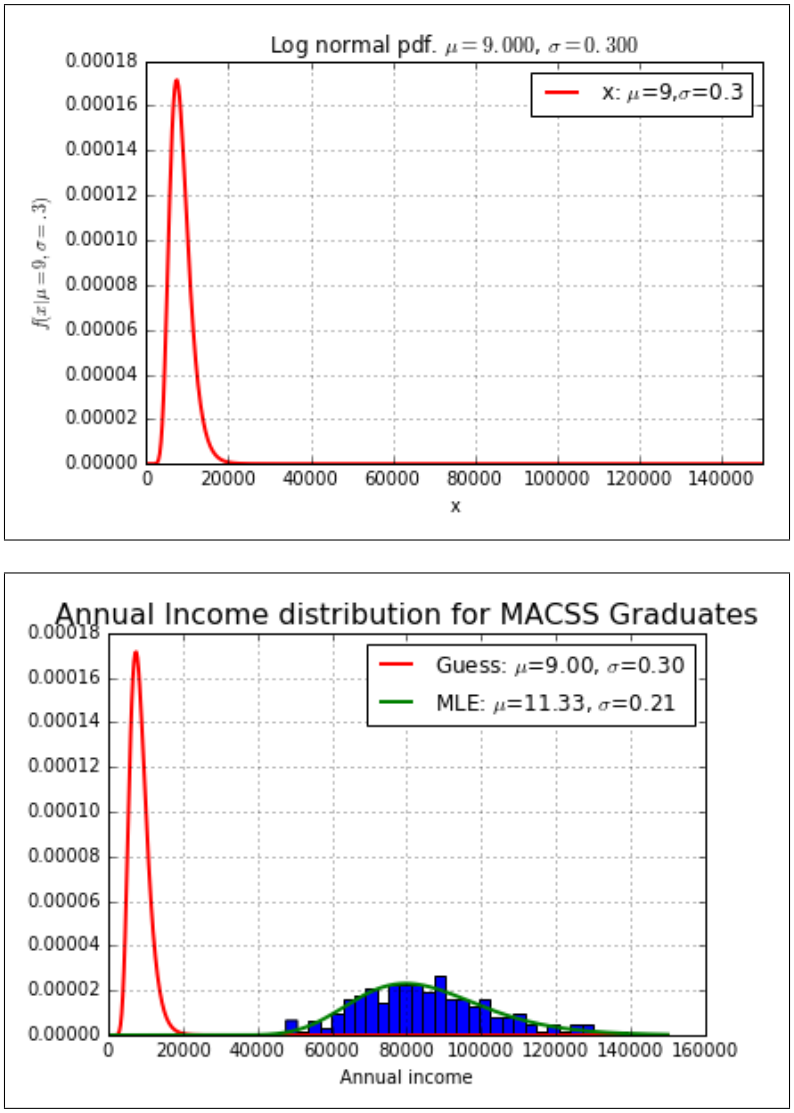
Part (c). $\mu_{mle} = 11.331, \sigma_{mle} = 0.212$.

The variance-covariance matrix is: $\begin{bmatrix} 2.22751506e-04 & 9.07282811e-07 \\ 9.07282811e-07 & 9.61285596e-05 \end{bmatrix}$

The log likelihood of the data given $\mu = 9$ and $\sigma = 0.3$ is -2239.53.

Part (d). The Chi square of H0 with 2 degrees of freedom p-value = 0.0. This number is too small (< 0.05) that the data is very unlikely to come from the distribution in part(b).

Figure 2: Lognormal PDF



Part (e). By this model, the probability that I will earn more than \$100,000 is 19.58% and 30.77% that I will earn less than \$75,000.

Excercise 2

Part (a).

$\beta_0^{mle} = .252 \quad \beta_1^{mle} = 0.013 \quad \beta_2^{mle} = 0.401 \quad \beta_3^{mle} = -0.0107 \quad \sigma_{mle} = 0.003$
The value of the log likelihood function is: 876.87.

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).
Likelihood Ratio Test p-value is: 0.0.

This number is too low ($< .05$) that is unlikely that age, number of children, and average winter temperature have no relationship with the number of sick days.