# Problem Set #2

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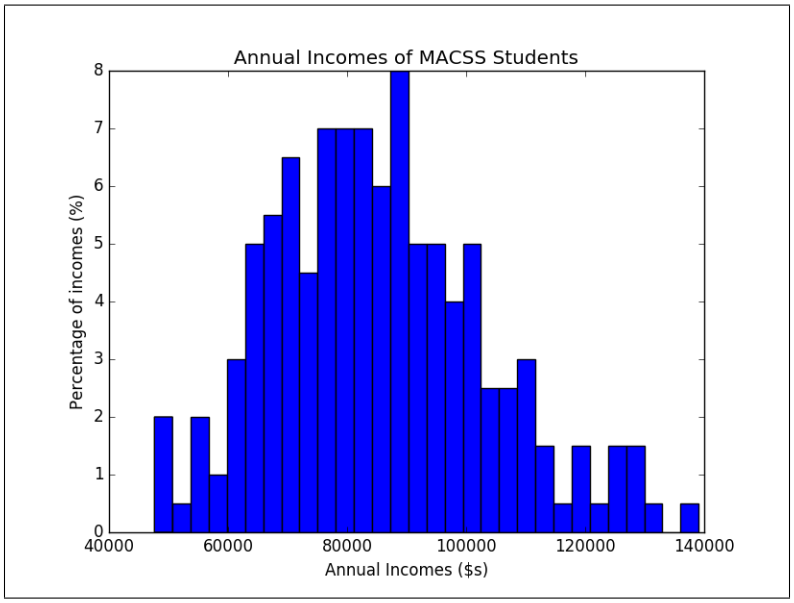
## Problem 1

**Part (a).**

**Figure 1: Question 1 part(a)**




**Part (b).** The value of the log likelihood value for this parameterization of the distribution and given this data is $-8298.637$.

**Part (c).** Firstly, $\mu_{mle} = 11.331, \sigma_{mle} = .212$. The log likelihood value of the data given these parameters is $-2239.535$. The variance-covariance matrix is:

$$\begin{bmatrix} 0.00429 & -0.00030 \\ -0.00030 & 0.00013 \end{bmatrix}$$

**Part (d).** The Likelihood Ratio Test p-value is: 0.0. This number is really low ($< .05$) so it is unlikely that the data came from the distribution in part (b).

**Part (e).** The probability that I will earn more than \$100,000 is 0.196.

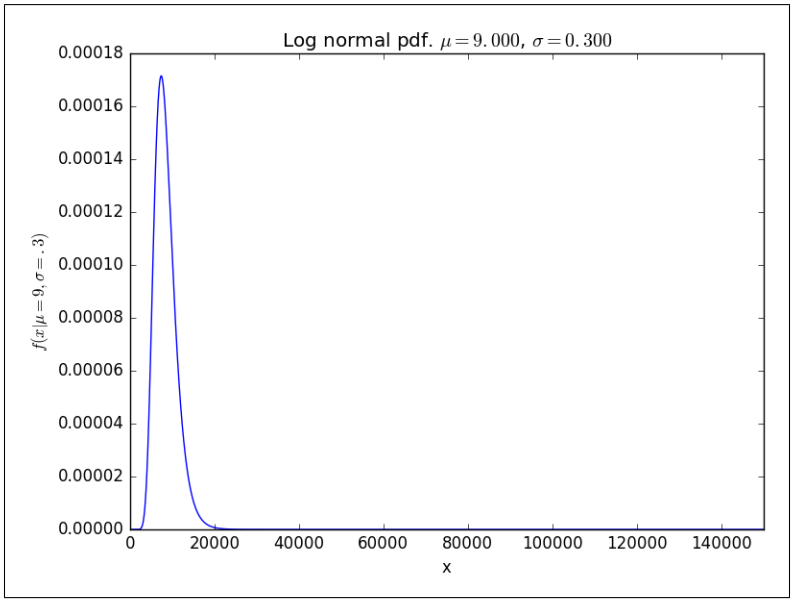
The probability that I will earn less than \$75,000 is 0.308.

## Problem 2

**Part (a).** $\beta_0^{mle} = .252 \quad \beta_1^{mle} = 0.013 \quad \beta_2^{mle} = 0.401 \quad \beta_3^{mle} = -0.009992 \quad \sigma_{mle}^2 = 9.11e-06$ The value of the log likelihood function is: 876.865. Unless you round to past 7 decimal places, the variance-covariance matrix just looks like this: $\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$

**Part (b).** Likelihood Ratio Test p-value is: 0.0

**Figure 2: Question 1 part(b)**




This number is really low ($< .05$), so it is unlikely that age number of children, and average winter temperature have no effect onthe number of sick days.

**Figure 3: Question 1 part(c)**