

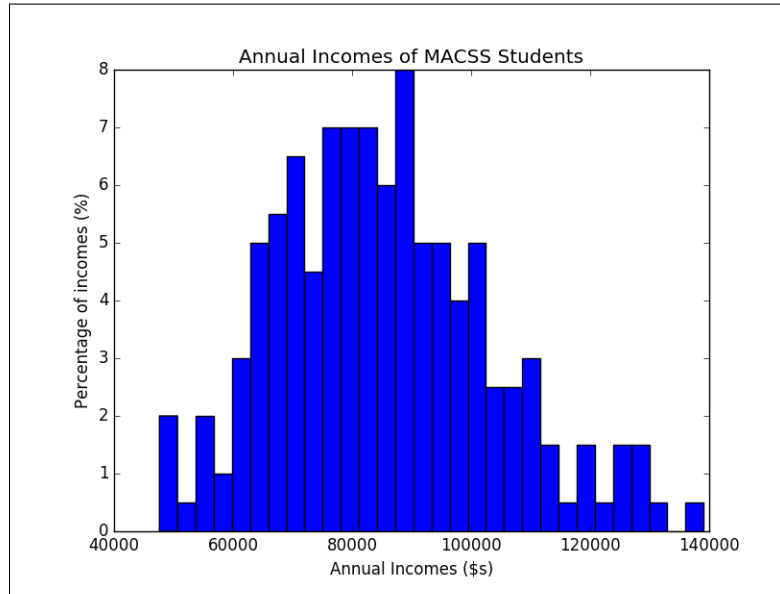
## Problem Set #2

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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  $-2239.535$ .

**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).**  $\beta_0^{mle} = .252$   $\beta_1^{mle} = -0.013$   $\beta_2^{mle} = -0.04$   $\beta_3^{mle} = 0.009992$   $\sigma_{mle}^2 = 9.11e - 06$  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:

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

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

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

Figure 2: Question 1 part(b)

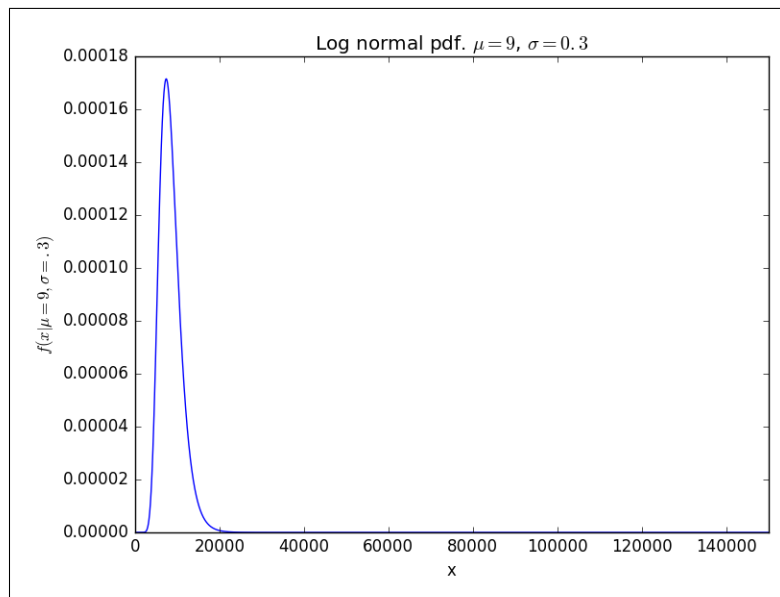


Figure 3: Question 1 part(c)

