Problem Set #2
MACSS 3000, Prof. Evans
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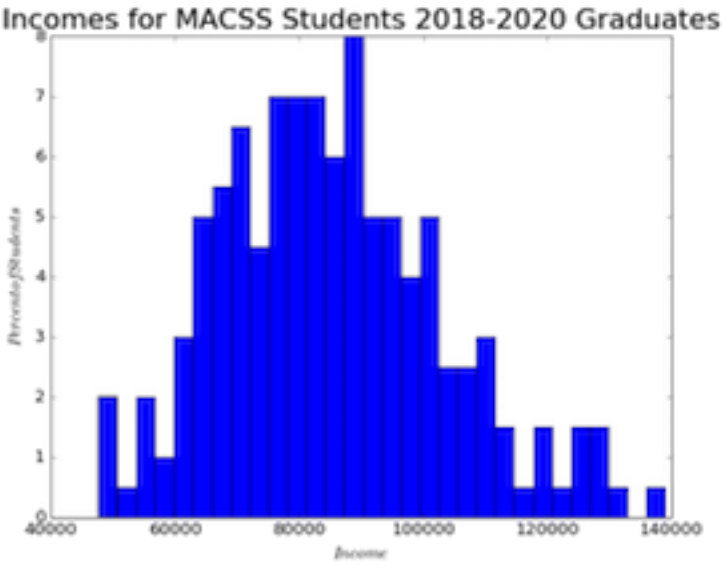
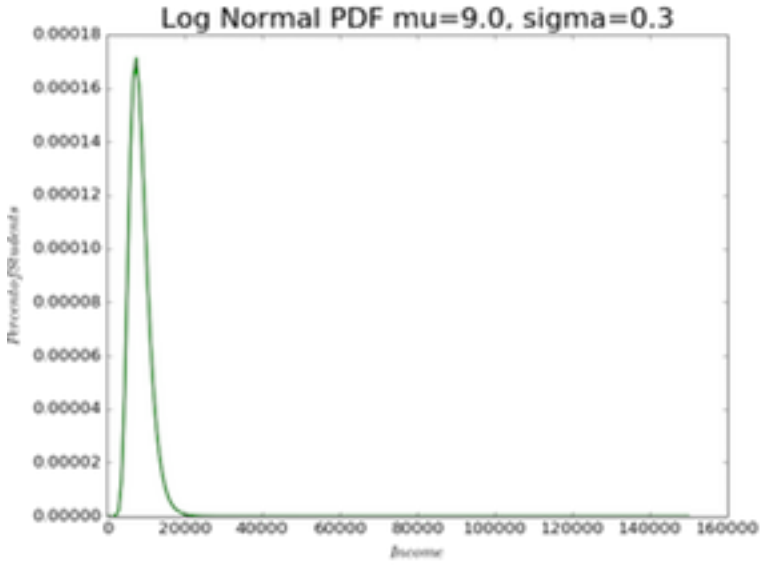
Problem 1

Part A



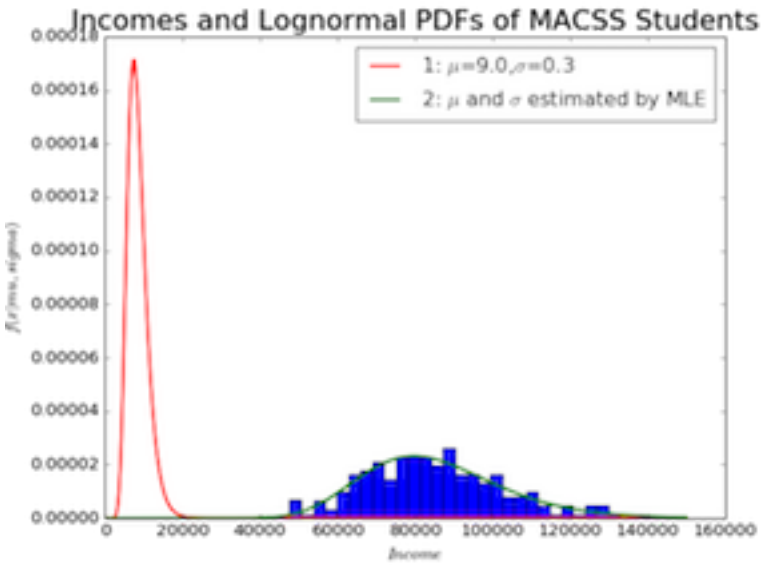
Part B

The graph of the log normal distribution is below. The value of the log likelihood for this paramterization is -8298.637.



Part C

The paramters I estimaged for the lognormal distribution are $\sigma_{MLE} = 0.212$ and $\mu_{MLE} = 11.331$. The Value of the likelihood function is -2239.53 and the variance-covariance matrix is
$\begin{bmatrix} 2.23666599e-04 & 1.45226622e-07 \\ 1.45226622e-07 & 1.11970392e-04 \end{bmatrix}$
Here is the graph of the histogram vs the two PDFs



Part D

The probability that the data comes from the distribution in part B is 0.0.

Part E

The probability a graduate will earn more than \$100,000 is 19.58%. The probability a graduate will earn less than \$75,000 is 30.7%.

Problem 2

Part A

My paramter estimates from MLE are β_0=0.251, β_1=0.013, β_2=0.401, β_3=-0.010, σ^2=0.040. The value of the log-liklihood function is: 459.04. 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

The likelihood ratio test p-value is 0.0 so it is unlikely that these variables have any effect on the number of sick days.