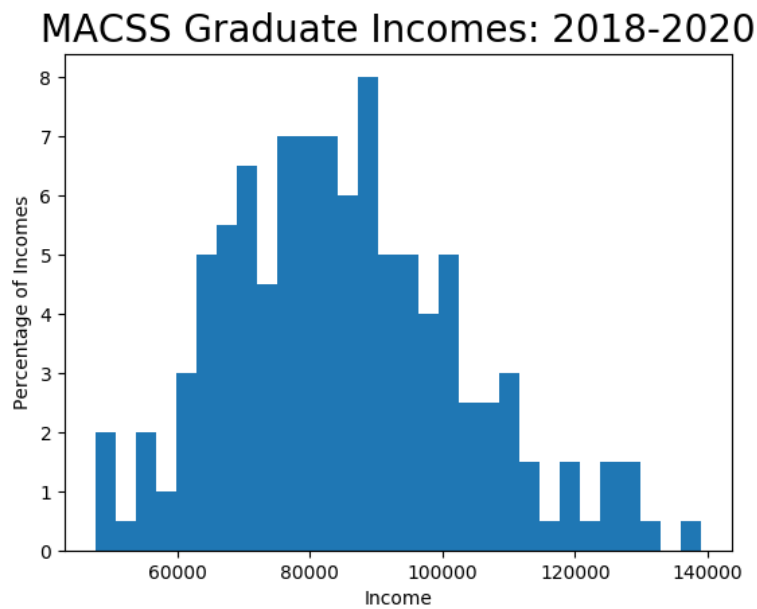


Problem Set #2

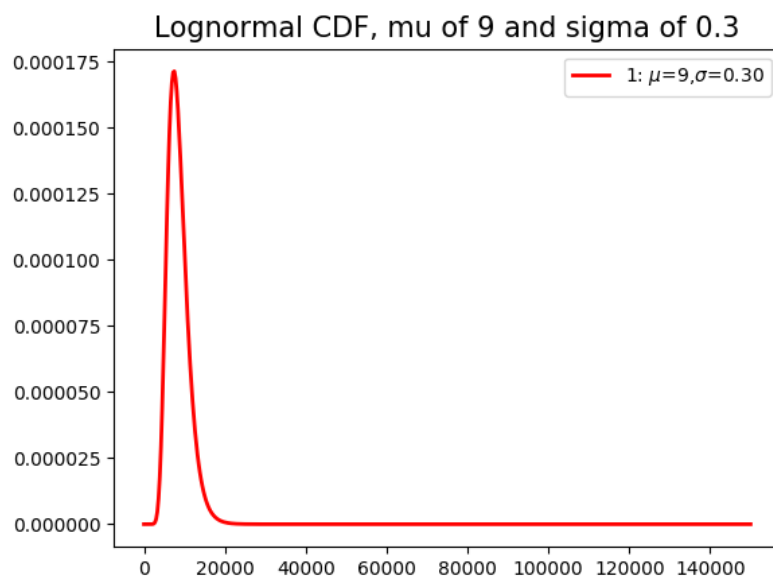
MACS 30100, Dr. Evans
Haylee Ham

1

Part a:

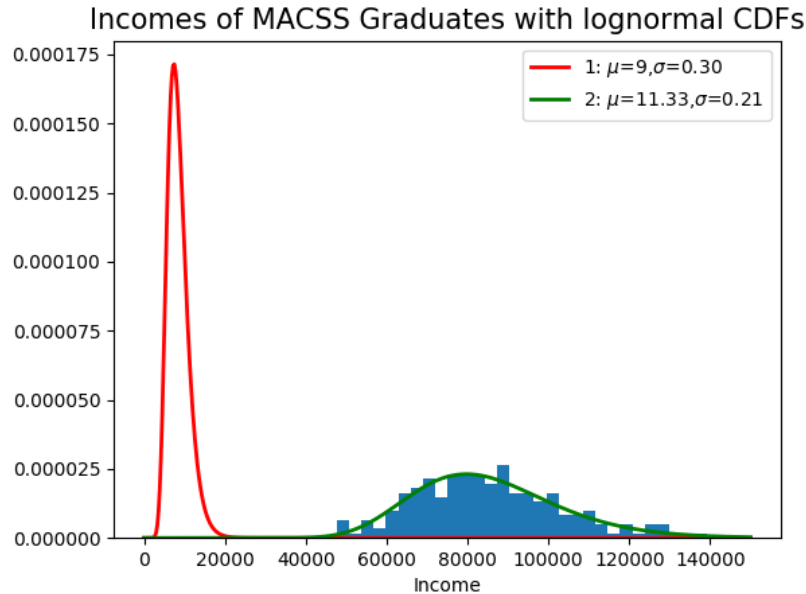


Part b: The log likelihood value for $\mu = 9.0$ and $\sigma = 0.3$ is 8298.6369561.



Part c: The maximum likelihood estimate for μ is 11.3314403293 and the estimate for σ is 0.211674579469. The log likelihood value for the ML estimates is 2239.534744. The variance/covariance matrix for the ML estimates is:

$$\begin{bmatrix} 1.87847158e-04 & -1.64747929e-05 \\ -1.64747929e-05 & 1.08213553e-04 \end{bmatrix}$$



Part d: The chi squared of the hypothesis with 2 degrees of freedom p-value = 0.0. This means that it is very unlikely that the incomes data came from the distribution whose μ is 9 and σ is 0.3.

Part e: The probability that I will earn more than \$100,000 is 19.58%. The probability that I will earn less than \$75,000 is 30.77%.

2

Part a:

The ML estimates:

$$\beta_0 = 0.252$$

$$\beta_1 = 0.013$$

$$\beta_2 = 0.401$$

$$\beta_3 = -0.00998$$

$$\sigma = 0.040$$

The value of the log likelihood function is 876.865.

The variance-covariance matrix for the ML estimates 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 chi squared of the hypothesis with 5 degrees of freedom p-value = 0.0. The probability that the parameters are correct and that age, number of children, and winter temperature have no effect on whether one will become sick is very unlikely and the hypothesis can be rejected.