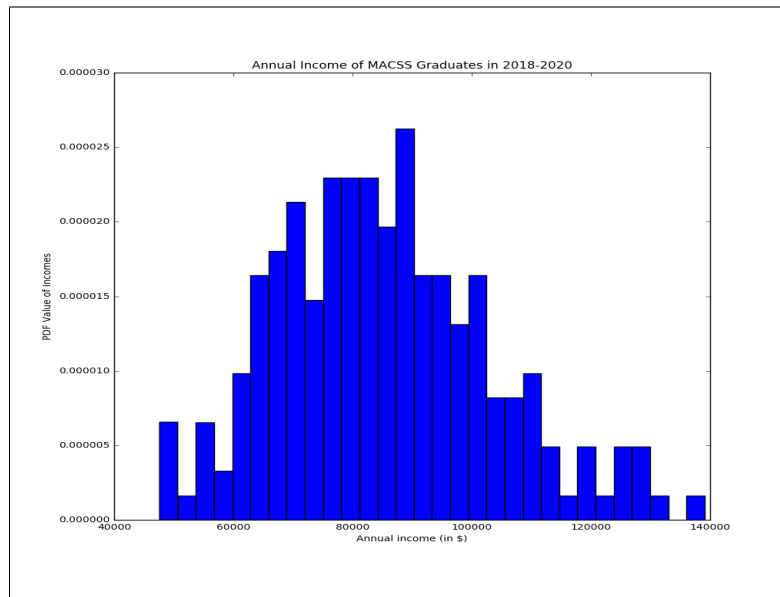


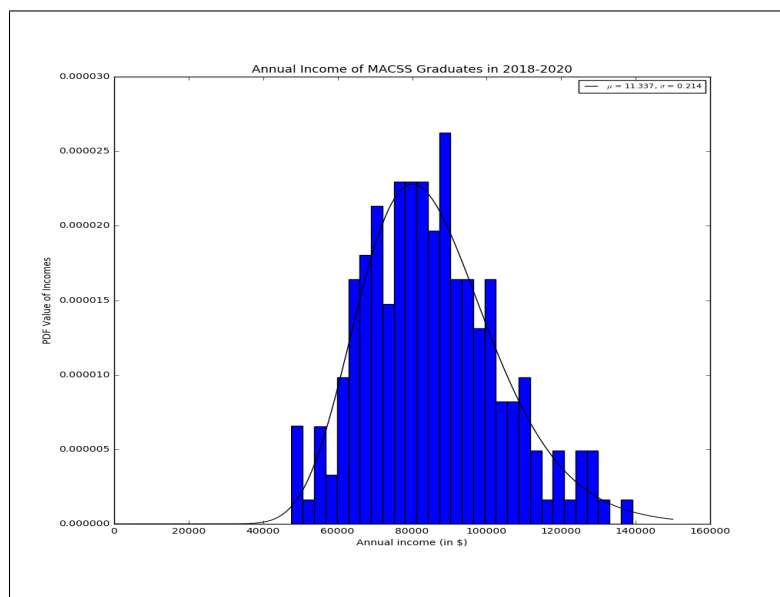
Problem Set #3

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Problem 1. Some income data, lognormal distribution, and GMM.
Part (a). Histogram for the income of the MACSS cohort:



Part (b).



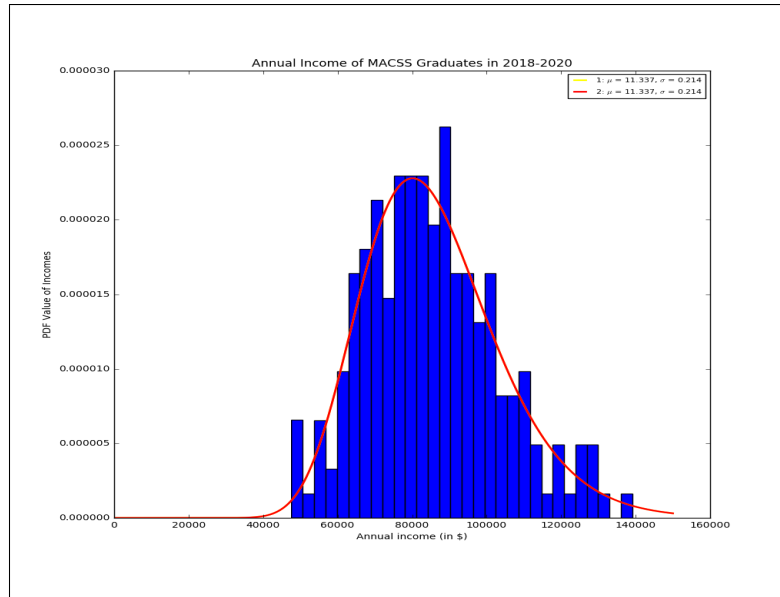
The GMM estimator of two moment conditions are: $\mu = 11.3369237377$, $\sigma = 0.213628960591$.
The value of GMM criterion function at the estimated parameter values is: $1.703844959e - 12$.

Data moments are: $\mu = 85276.82360625808$, $\sigma = 18037.692869371564$.

Model moments at the estimated parameter values are: $\mu = 85276.73531675598$,
 $\sigma = 18037.6785304$.

The values are almost same.

Part (c).



The GMM estimator of two moment conditions are: $\mu = 11.3369239366$, $\sigma = 0.21362938644$.
The value of GMM criterion function at the estimated parameter values is:
 0.0110862517048 .

And the data moments are: $\mu = 85276.82360625808$, $\sigma = 18037.692869371564$.

Model moments at the estimated parameter values are: $\mu = 85276.73531675598$,
 $\sigma = 18037.6785304$.

Part (d).

The GMM estimator of two moment conditions are: $\mu = 11.3356813274$, $\sigma = 0.21059845372$.
The value of GMM criterion function at the estimated parameter values is:
 $2.5347883616e - 11$.

The three data moments are:

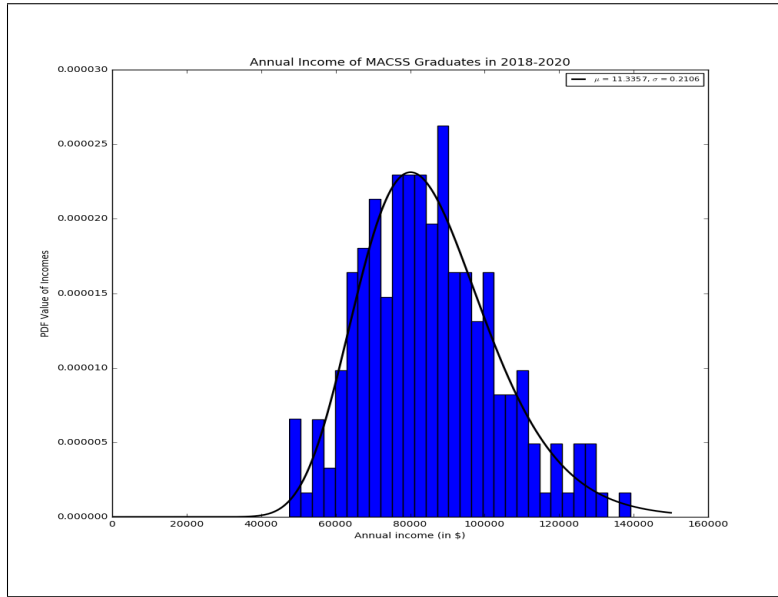
the proportion of individuals who earn less than \$75,000 is: 0.3,

the proportion of individuals who earn more than \$75,000 but less than \$100,000 is:
0.5,

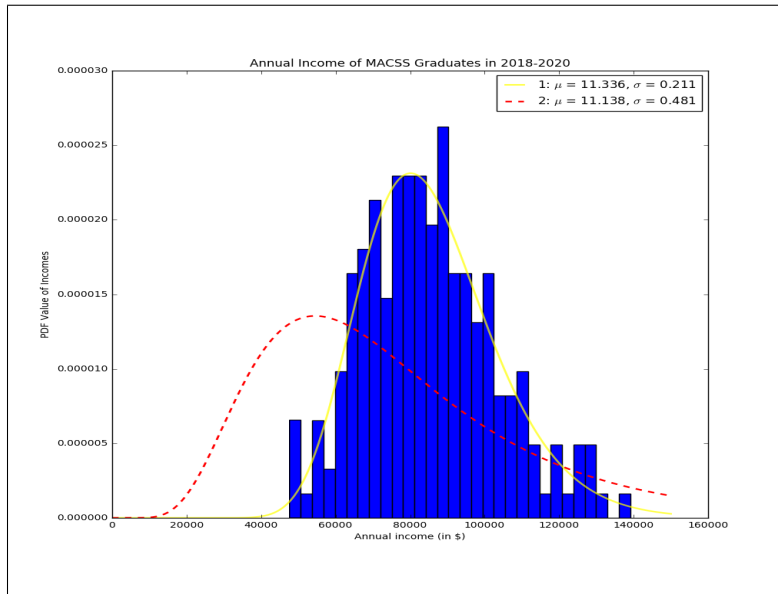
the proportion of individuals who earn more than \$100,000 is: 0.2.

The three model moments are:

the proportion of individuals who earn less than \$75,000 is: 0.30000000363261387,
the proportion of individuals who earn more than \$75,000 but less than \$100,000 is:
0.5000000058562907,
the proportion of individuals who earn more than \$100,000 is: 0.19999999051109518.
The values are almost the same, the model moments being extremely close to data
moments.



Part (e).



The GMM estimator of two moment conditions are: $\mu = 11.1375923873, \sigma = 0.481189876193$.

The value of GMM criterion function at the estimated parameter values is:
7.1824522242.

The three data moments are:

the proportion of individuals who earn less than \$75,000 is: 0.3,

the proportion of individuals who earn more than \$75,000 but less than \$100,000 is:
0.5,

the proportion of individuals who earn more than \$100,000 is: 0.2.

The three model moments are:

the proportion of individuals who earn less than \$75,000 is: 0.5722693450896191,

the proportion of individuals who earn more than \$75,000 but less than \$100,000 is:
0.21003825964773393,

the proportion of individuals who earn more than \$100,000 is: 0.21769239518881034.

These model values are less close to the data moments.

Part (f).

From the above five figures, we could see that lognormal pdf figure in fig b, c, d seem to fit the data well. Among these, the pdf generated in part b seems to be the best fit since it has the lowest criterion value.

Problem 2. Linear regression and GMM.

Part (a).

The estimators are:

$$\beta_0 = 0.252222634225$$

$$\beta_1 = 0.0130232295439$$

$$\beta_2 = 0.399763391107$$

$$\beta_3 = -0.0100603677526$$

The value of the criterion function at estimated parameter values is 0.0148567892995.