

Department of Computer Engineering

CENG 222
Statistical Methods for Computer Engineering
Assignment #3

Due Date: April 24, 2019, Wednesday 11:59PM

In a small village, several vehicles use a bridge to cross over a river. Everyday several motorcycles, automobiles, and trucks use this bridge.

The number of motorcycles that pass over the bridge on a day is a Poisson random variable with $\lambda = 40$.

The number of automobiles that pass over the bridge on a day is a Poisson random variable with $\lambda = 30$.

The number of trucks that pass over the bridge on a day is a Poisson random variable with $\lambda = 20$.

The weight of each motorcycle is a Gamma distributed random variable in kilograms with $\alpha = 16$ and $\lambda = 0.15$.

The weight of each automobile is a Gamma distributed random variable in kilograms with $\alpha = 60$ and $\lambda = 0.05$.

The weight of each truck is a Gamma distributed random variable in kilograms with $\alpha = 84$ and $\lambda = 0.01$.

(a) Conduct a Monte Carlo study to estimate the probability that the total weight of all the vehicles that pass over the bridge in a day is more than 220 tons. With probability 0.99, your answer should differ from the true value by no more than 0.02. Use Normal approximation to determine the size of your Monte Carlo simulation. Use Example 5.9 from the book to sample from the Poisson distribution and Example 5.11 to sample from the Gamma distribution.

(b) Based on the study in part (a), estimate the total weight, X , of all the vehicles that pass over the bridge in a day.

(c) Estimate $\text{Std}(X)$ and comment on the accuracy of your estimator of X .

Submission

Submit your Matlab source code and a short report that describes the Monte Carlo study and answers the questions in parts (a), (b), and (c) via ODTU-Class before the deadline. Your report can be a Word/Latex pdf document or can be a handwritten and scanned pdf/jpeg file. Late submission is allowed with 20 points per day late submission penalty.