Student Information

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Answer 1

a) $N \geq (\frac{z_{\alpha/2}}{\varepsilon})^2$
$1 - \alpha = 0.99 \implies \alpha = 0.01$
$z_{\alpha/2} = z_{0.005} \approx 2.575$
$N \geq (\frac{2.575}{0.02})^2$
$N \geq 16576.5625$
The size of the Monte Carlo study must be at least $N = 16577$.

b.1) $E(X) = \frac{\alpha}{\lambda}$ for a Gamma distributed random variable X. Substituting $\alpha = 190$ and $\lambda = 0.15$ we get:
$E(X)_{gamma} = \frac{190}{0.15} = 1266.\overline{6}$
The expected value for the weight of an automobile is $1266.\overline{6}$

b.2) $E(X)_{gamma} = \frac{\alpha}{\lambda} = \frac{110}{0.01} = 11000$

b.3) Expected value for the total weights of all automobiles that pass over the bridge on a day is equal to the number of automobiles that pass over the bridge on a day multiplied by the expected value for the weight of an automobile.
We know the expected value for the weight of an automobile is $E(X) = 1266.\overline{6}$.
The number of automobiles that pass over the bridge on a day is a Poisson random variable with $\lambda = 50$.
$E(X)_{poisson} = \lambda = 50$
Expected value for the total weights of all automobiles that pass over the bridge on a day is:

$$50 \times 1266.\overline{6} = 63333.\overline{3}$$

b.4) The number of trucks that pass over the bridge on a day is a Poisson random variable with $\lambda = 10$. Expected value for the total weights of all trucks that pass over the bridge on a day is

$$10 \times 11000 = 110000$$

Answer 2

1)