CENG 222

Statistical Methods for Computer Engineering

Spring '2017-2018

Take Home Exam 3

Deadline: May 25, 23:59

Submission: via COW

Student Information

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Answer 1

In order to decide the Monte Carlo Study size I used this formula:

$$N \geq 0.25(\frac{z_{a/2}}{\epsilon})^2$$

For $\epsilon = 0.005$ and $z_{0.05/2} = 1.96$

$$N \geq 38,416$$

In addition, for estimating the condition $W >= 2 * S$, I used double integral

$$\int_0^\infty \int_0^{w/2} w * s * e^{-w-s} ds dw$$

And the result of this is

$$\int_0^\infty \int_0^{w/2} w * s * e^{-w-s} ds dw = \frac{7}{27}$$

Finally for 5 hours $\lambda = 20$.

I generated a poisson(20) for minion number and random number array[minion number]. I checeked random numbers and the probability (0.25) if true I counted as 1 or 0. As a result I counted minions that met condition. Then I did this simulation N times, and took average of it.

Answer 2

First, I found the marginal PDF of W using this formula:

$$f_W(w) = \int_0^\infty f_{WS}(w, s)ds, \text{ for all } w$$

And the marginal PDF of W is

$$f_W(w) = \frac{w}{e^w}$$

The maximum value that $f_W(w)$ can be was 1 so while using rejection method I used $a = 0,\ b = 6,\ c = 1$ to generate a weight for a minion.

I generate minion number with poisson(20), and generate a random weight for each minion. Then, I sum all weights. I did this simulation for N size and take mean of the results.

Answer 3

I generate a exp(3) and N(0,1) numbers with built-in generators. Then, I calculated the result of the question, and I did it N times, and took the average. (I didn't know how many times I run the simulation, so I used N from the first question.)