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Homework 4, CENG222

Part A)

The probability is 0.98 according to the given question, which means that alpha (α) equals 0.02. The error is stated as 0.03.

To find the value of z\_α/2, which here is known as z\_0.01 is -2.326. To determine the size of the Monte Carlo study, the formula for the size as stated in the book.

Substituting the values, we get (as an integer) N = 1503.

estimated probability after conducting the Monte Carlo study in Octave is 0.125.

Part B)

As shown in the picture below Weight is closest to 260073 as integer.

Part C)

In Octave reveals that the estimated std is 33142 as integer.

It is observed that the standard deviation is relatively small in comparison to the mean, with a ratio of approximately std divided by mean =0.127.

This indicates that the results obtained are reasonably precise and accurate.

CODE and Picture are below:

code start:

n = 1503;

estimated\_probability = 0;

expected\_weight = 0;

standard\_deviation = 0;

weights = zeros(n, 1);

ship\_lengths = [50 40 25];

weight\_a = [60 100 120];

weight\_l = [0.1 0.05 0.02];

u = 0;

tmp = 0;

f = 0;

current\_length = 0;

current\_weight = 0;

ndex = 10000000;

for sample\_idx = 1:n

for ship\_idx = 1:3

current\_length = ship\_lengths(ship\_idx);

u = rand;

tmp = 0;

f = exp(-current\_length);

for i = 1:ndex

x = x + 1;

f = f + exp(-current\_length) \* current\_length^x / gamma(x + 1);

if (u <= f)

break;

endif

endfor

for i = 1:tmp

current\_weight = sum(-1 / weight\_l(ship\_idx) \* log(rand(weight\_a(ship\_idx), 1)));

weights(sample\_idx) = weights(sample\_idx) + current\_weight;

endfor

endfor

endfor

estimated\_probability = mean(weights > 300000);

expected\_weight = mean(weights);

standard\_deviation = std(weights);

fprintf("Weight: %f\n", expected\_weight);

fprintf("Std %f\n", standard\_deviation);

fprintf("Probability %f\n", estimated\_probability);

code end

A screenshot of a computer

Description automatically generated with medium confidence