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CENG 222 HOMEWORK 3 REPORT

a)

1- Inspect the existing plots and comment on them. What do Figure 1, Figure 2 and Figure 3 show?

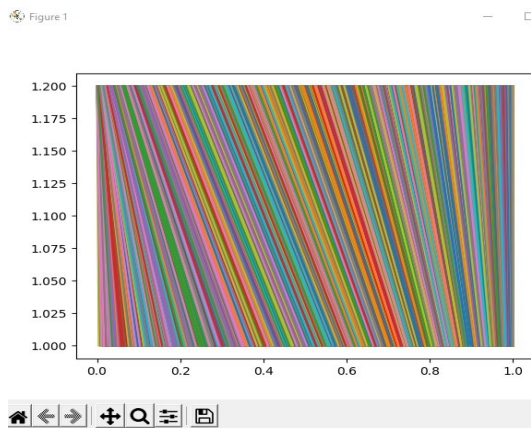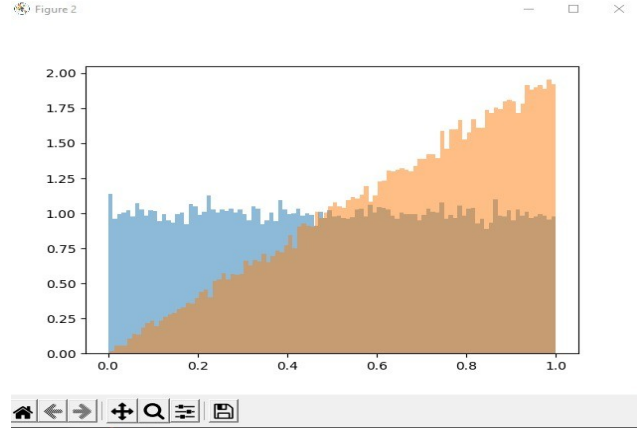FIGURE 1   FIGURE 2

In Figure 1, the line of the random variable towards the beginning and towards the end becomes perpendicular with respect to its inverse, and it is get curved in the middle.
In Figure 2, we observe the change of the random variable and its inverse relative to each other. When the random variable is 0.5 less than, its inverse is less than that random variable. When the random variable is greater than 0.5, its inverse will be greater than that random variable. That situation is valid for the values between 0 and 1.

FIGURE 3
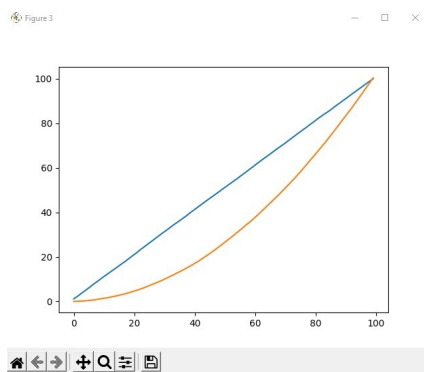
In figure 3,according to the graph the cumulative sum of random variable list is going to zero to one hundred but the values on the x-axis should be between 0 and 1, they go up to 100. When we divide the y-axis and the x-axis by 100, the cumulative sum is 1, which is the logic of the cumulative sum.
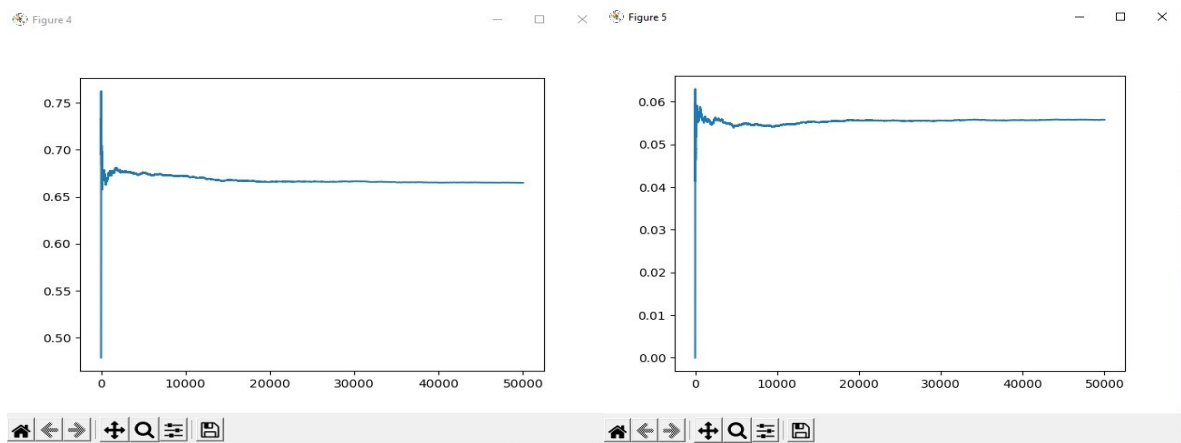
2- Calculate the expected value and variance of X.

CDF = x^2 , 0 <= x <= 1, The derivative of F(x) => F'(x) = 2x

Expected value = E(x) = $\int_0^1 xf(x)dx$ = 2/3 = 0.666666

Variance = E(x^2) - $E(x)^2$ = $\int_0^1 x^2 f(x)dx$ - $\left(\int_0^1 xf(x)\right)^2$ = 1/2 – 4/9 = 0.055556.

3- Compare your results with the simulation outputs in Figures 4 and 5.

In figure 4, the expected value is around about 0.6666. It is very close to my solution.

In figure 5, the variance is around about at 0.55556. It is very close to my solution.

b)

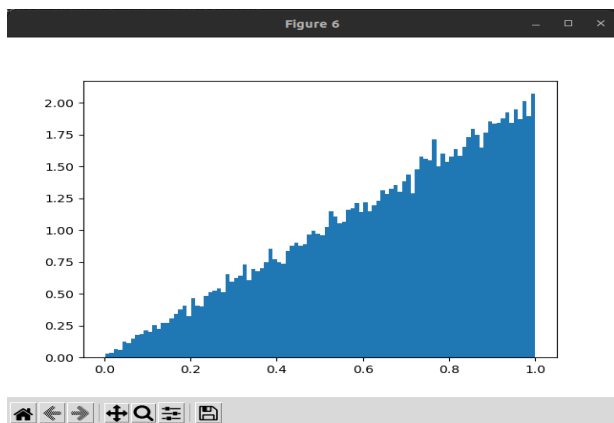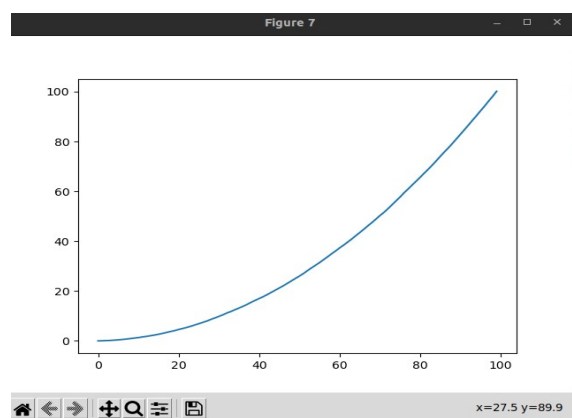1- Inspect the existing plots and comment on them. What do Figure 6 and Figure 7 show?

FIGURE 6   FIGURE 7

In figure 6: According to the rejection, a new random v value is taken and v * c is equal to the y value. If the y value is greater than x = (b-a) * u + a, rejection occurs. If x is 0, the value of v must also be 0 so that there will be no rejection

and the probability of v being 0 will be low, so the number of 0 in the histogram will be less than the number of 1, as a piece, it will be curved.
In figure 7: When we integrate the equation and add it up we get a cumulative sum and it's parabolic.
2- Compare your results in (a) with the simulation outputs in Figures 8 and 9.

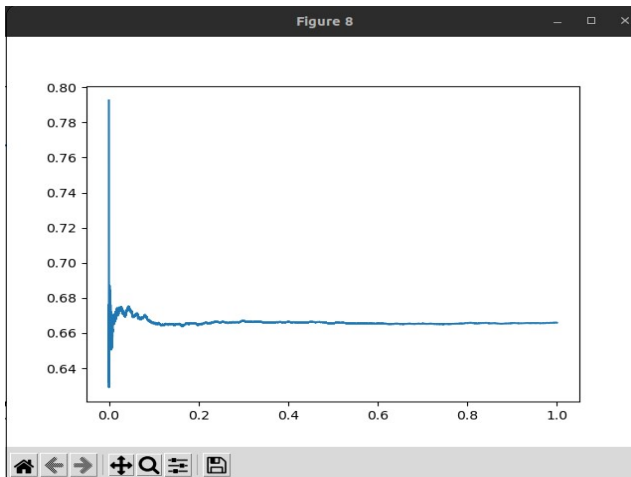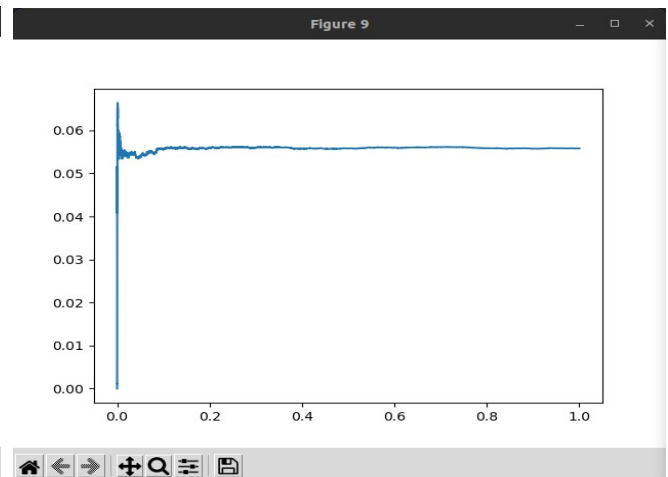FIGURE 8   FIGURE 9

In figure 8 and 9: Mean and variance are very close to part a.