

CENG 114
Probability and Statistics
HOMEWORK 2
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a)

- Figure 1 shows us the relation between x and u . It helps us to see how inverse transformation method work.
- In histograms in figure 2 we can observe uniformly generated random numbers pdf in blue colour. Histogram with orange colour shows pdf of randomly generated numbers.
- Figure 3 is plot of cdf. Densities summs up cumulatively. We obtain 1 when we accumulate density.

Calculating expected value:

$$F(x) = x^2, \quad f(x) = 2x$$

$$E(x) = \int_0^1 x f(x) dx$$

$$E(x) = 2/3$$

Calculating variance:

$$E(x) = \mu$$

$$Var(x) = \int_0^1 (x - \mu)^2 f(x) dx$$

$$Var(x) = 1/18$$

- In simulation average converges 0.6667947075786336, it is very close to calculated expected value $2/3$.
- In simulation variance converges 0.05546372190921575 and it is also very close to calculated variance $1/18$.

b)

- Histogram in figure 6 shows pdf of random numbers generated according to given cdf using rejection method.
- Figure 7 is plot of the cdf. Densities sum up cumulatively. We obtain 1 when we accumulate density
- In simulation using rejection method average converges 0.666831932426513, it is very close to calculated expected value $2/3$.
- In simulation using rejection method variance converges 0.05561448442355019 and it is also very close to calculated variance $1/18$.