Lab3

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Question 1

I have assumed g(x) to be the uniform distribution in (0,1)

a)

Since the process of generating a random variable distribution follows Geometric distribution(we have to get a random variable that satisfies the given condition u$\geq \frac{f(X)}{cg(X)}$) and the probability of satisfying this condition is $\frac{1}{c}$, the average number of iterations is c.

b)

Sample mean=0.33331

E(X)=$\int_0^1 20x^2(1-x)^3dx$ (substituting x=$sin^2\theta$)

=$\frac{1}{3}$

c)

Exact value=$\int_{\frac{1}{4}}^{\frac{3}{4}} 20x^2(1-x)^3dx$

=$\frac{79}{128}$

=0.61718

Value Calculated from sample=0.6118

d)

Average number of iterations required from theory=c=$\frac{136}{64}$=2.125

Average number of iterations required for the sample=2.1397

e)

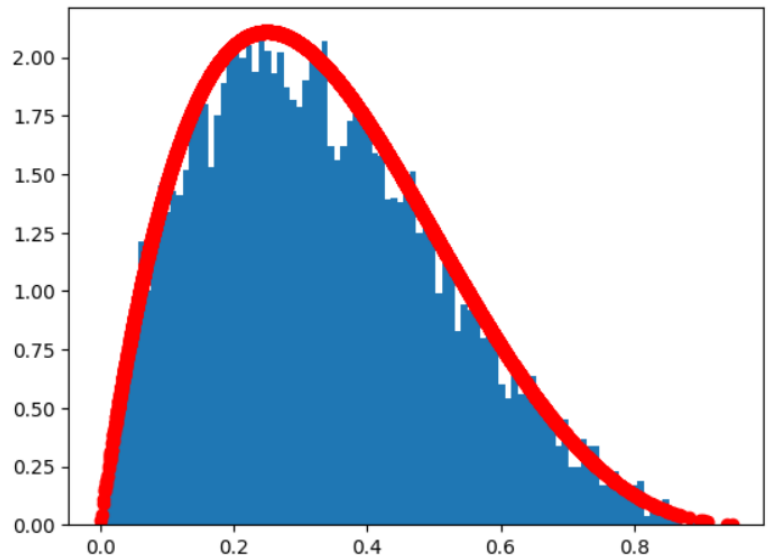

Figure 1: scatter plot vs histogram

f)

average number of iterations required has increased

for c_1=3 it is 2.953

for c_2=5 it is 5.035

Question 2

I assumed dominating PDF to be the uniform distribution in (0,1) and α=4

f(x)=k$x^{\alpha-1}e^{-x}$

We have to find k such that

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

On solving,

k=$\frac{e}{6e-16}$

As f(x) is an increasing function in (0,1),

maximum value of f(x)=$\frac{1}{6e-16}$

and therefore the rejection constant=$\frac{1}{6e-16} = 3.229$

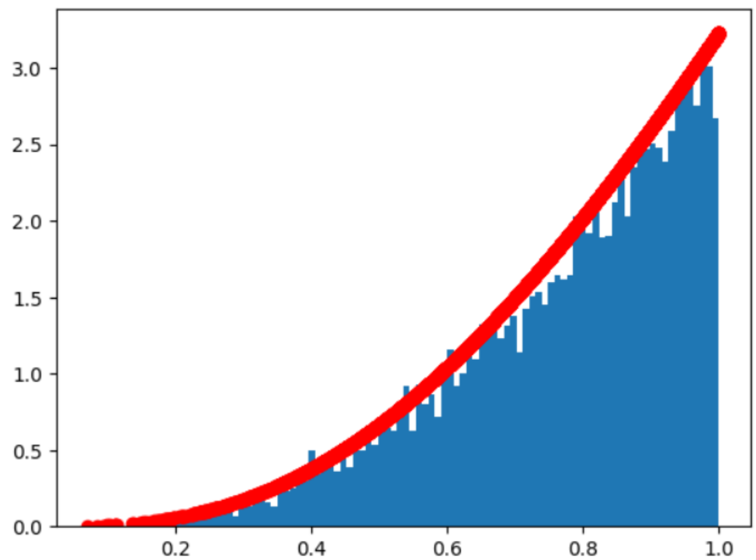

Figure 2: scatter plot vs histogram