Monte Carlo MAP 5615 HW1

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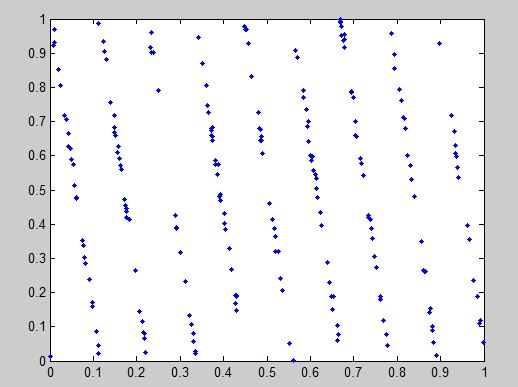
1

1. The LCG can only produce at most m distinct values. If (a, m) = 1, the maximum number of distinct values should be m.
2. If (a, m) = d, . Thus the maximum number of distinct values is .

To make the period of LCG as large as possible, it is better to choose (a, m) = 1

3

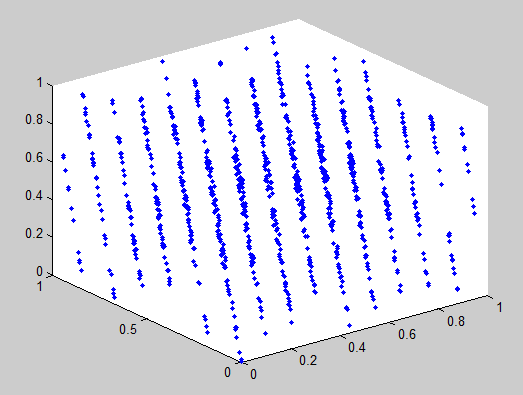
6



We already know .

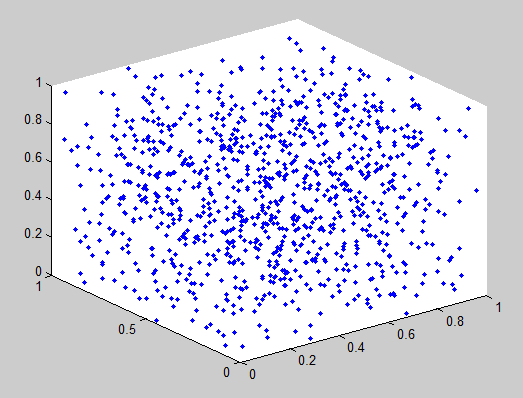
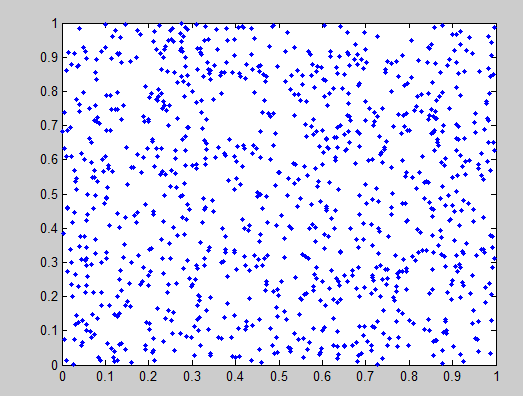
To plot , where

Then 0<k<10, and thus the pairs must lie on no more than 9 lines on

1. 

From the graph we can see there are 15 planes.

7



In the graph of pairs and triples there is no regular order. Mersenne twister provides for generation of high quality pseudorandom numbers.

Appendix

Code for problem 6

function I=RANDU(x0,N)

x=[];

x(1)=x0;

for i = 2:N;

x(i)= mod(65539\*x(i-1), 2^31);

end

I=x;

u=x/2^31;

%for i = 2:20003;

% if u(i+1)<=0.51 && u(i+1)>=0.5;

%plot(u(i), u(i+2), '.');

%hold on

%end

%end

u1=u(1:1000);

u2=u(2:1001);

u3=u(3:1002);

plot3(u1,u2,u3, '.');

end