**Matlab Code for Example of Bernouliizing a Joint Normal**

%PROGRAM NAME: bernorm.m

% This code Bernoulli-izes a 2-D Normal (X1 , X2)

mu = [0 0];

sigma1 = 1; sigma2 = 1;

r12true = 0.0 %<- \*\*\*\*\* PLAY AROUND WITH THIS \*\*\*\*\*

sigma12 = r12true\*sigma1\*sigma2;

SIGMA = [sigma1^2 sigma12 ; sigma12 sigma2^2];

n=30; % Sample Size

nsim = 5000; % Number of Simulations

Rx12 = zeros(1,nsim); P2g1 = zeros(1,nsim); P2=P2g1;

for nn = 1:nsim

x = mvnrnd(mu,SIGMA,n);

m1 = mean(x(:,1)); s1 = std(x(:,1));

m2 = mean(x(:,2)); s2 = std(x(:,2));

mhat = [m1 m2];

stdhat = [s1 s2];

rx12 = corrcoef(x); rx12 = rx12(1,2);

if nn == 1

figure(1)

plot(x(:,1),x(:,2),'+')

pause

end

Rx12(nn) = rx12;

% Bernoulli-ize [B=1] <-> [mu-std < X < mu+std] <- \*\*\*AND THIS\*\*\*

b = zeros(n,2);

for k=1:2

for j = 1:n

if abs(x(j,k)-mhat(k)) < stdhat(k)

b(j,k) = 1;

end

end

end

pb = mean(b);

w = b(:,1).\*b(:,2);

p11 = mean(w);

p2g1 = p11/pb(1);

pb2 = pb(2);

P2g1(nn) = p2g1;

P2(nn) = pb2;

end

figure(2)

hist(Rx12,20)

title('Histogram of Rx12t')

pause

figure(3)

hist(P2g1,20)

title('Histogram of P2g1')

pause

rp = P2g1./P2;

figure(4)

hist(rp,20)

title('Histogram of rp = P2g1/P1')