%read SymbolSequence.txt and NoiseSequence.txt

fileID = fopen('SymbolSequence.txt');

read = textscan(fileID, '%f');

fclose(fileID);

in = read{1};

fileID = fopen('NoiseSequence.txt');

read = textscan(fileID, '%f');

fclose(fileID);

noise = read{1};

n\_values = 1000000;

SNR\_dB = -5 : 10;

SNR = 10.^(SNR\_dB / 10);

n = 1;

p = 3 / 2 \* n \* SNR;

%theoretical calculations

%threshold calculation

low\_bound = zeros(16, 1);

up\_bound = zeros(16, 1);

for i = 1:16

low\_bound(i) = -n/sqrt(p(i))\*(p(i)/(2\*n)+log(2));

up\_bound(i) = n/sqrt(p(i))\*(p(i)/(2\*n)-log(3/2));

end

%computing theoretial error.

%p\_th = 1/6\*qfunc(1/2./sqrt(p).\*(3/2\*SNR-log(2))) + 1/3\*qfunc(-1/2./sqrt(p).\*(3/2\*SNR+log(2))) + 1/3\*qfunc(1./sqrt(p)/2.\*(3/2\*SNR-log(3/2))) + 1/2\*qfunc(-1./sqrt(p)/2.\*(3/2\*SNR + log(3/2)));

%emperical calculatrion

out = zeros(n\_values, 1);

for j = 1:16

x = (in - 1) \* sqrt(p(j));

y = x + noise;

for i = 1:n\_values

if y(i) < low\_bound(j)

out(i) = 0;

elseif y(i) > up\_bound(j)

out(i) = 2;

else

out(i) = 1;

end

end

error = in ~= out;

p\_error(j) = mean(error); %find the probability of error.

p\_msg = sprintf('The probability of error is %f for SNR\_dB %d', p\_error(j), SNR\_dB(j));

%t\_msg = sprintf('The theoretical probability is %f.', p\_th(j));

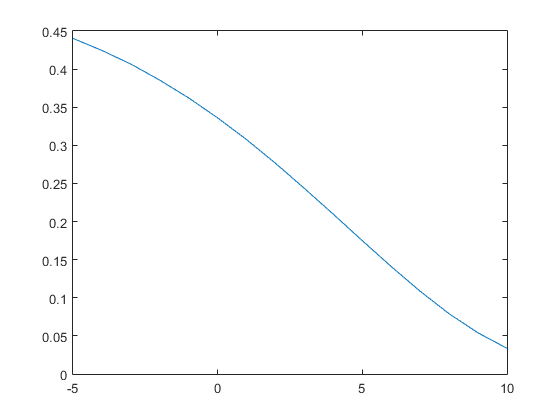
disp(p\_msg);

%disp(t\_msg);

end

figure;

plot(SNR\_dB, p\_error);



I couldn’t get an accurate probability for the theoretical, so this is only with the empirical.