MATLAB Script for Question 2

```
% 15/1/2016
% ELEG390 HW1 Q2 - Computer Experiment: Digital Com.; PSK; AWGN
clear all;close all;clc;
% Source
%========
SourceMessage = ['Hello ELEG 390 Spring 2016 + + + + Try This Out + + + +, Your Grade Can be: A']
D=double(dec2bin(SourceMessage))-48;     % ASCII representation of the message in binary
[k,n]=size(D);      % k: number of characters; n: number of bits per character (7)
N=k*n;              % Total Number of message bits
d=reshape(D',1,N);  % Binary source sequence
%-------------------------------------------------------------------------------
% Transmitter
%============
u=2*d-1;                % Represent "0" as -1V ; Represent "1" as 1V
% Pulse Generation
Ns=1000;
m=reshape(repmat(u,Ns,1),N*Ns,1)';  % Message (Waveform)
% Modulation
Ac=1;                               % Carrier Amplitude
fc=2;                               % Carrier frequency
t=0:1/Ns:N-(1/Ns);
c=Ac*cos(2*pi*fc*t);                % Carrier wave
s=c.*m;                             % Transmitted Signal
%-------------------------------------------------------------------------------
% Channel
%=========
SNR = 0;                            % SNR in dB
snr = 10^(SNR/10);                   % SNR
P= sum(s.^2)/length(s);              % Signal Power
N0= 2*Ns*(P/snr);                          % Noise "Power"
w=sqrt(N0)*randn(1,length(s));    % Random Gaussian Noise
x=s+w;                              % Received Signal
%-------------------------------------------------------------------------------
% Receiver
%==========
v=reshape(x,Ns,N)';                                 % arranging bit waveforms
t1=0:01/Ns:1-(1/Ns);
Lo=repmat(Ac*cos(2*pi*fc*t1),length(d),1);          % Local carrier
yT=sum(Lo.*v,2)/Ns;                                 % Correlator
de=(yT')>0;                                         % Decision; Detected bits
Deb=reshape(de',n,k)'+48;                           % Re-generate ASCII message
ReceivedMessage=char(bin2dec(char(Deb)))'           % Received Message
BER = length(find(abs(de-d)))/N;                    % Bit Error Rate
```