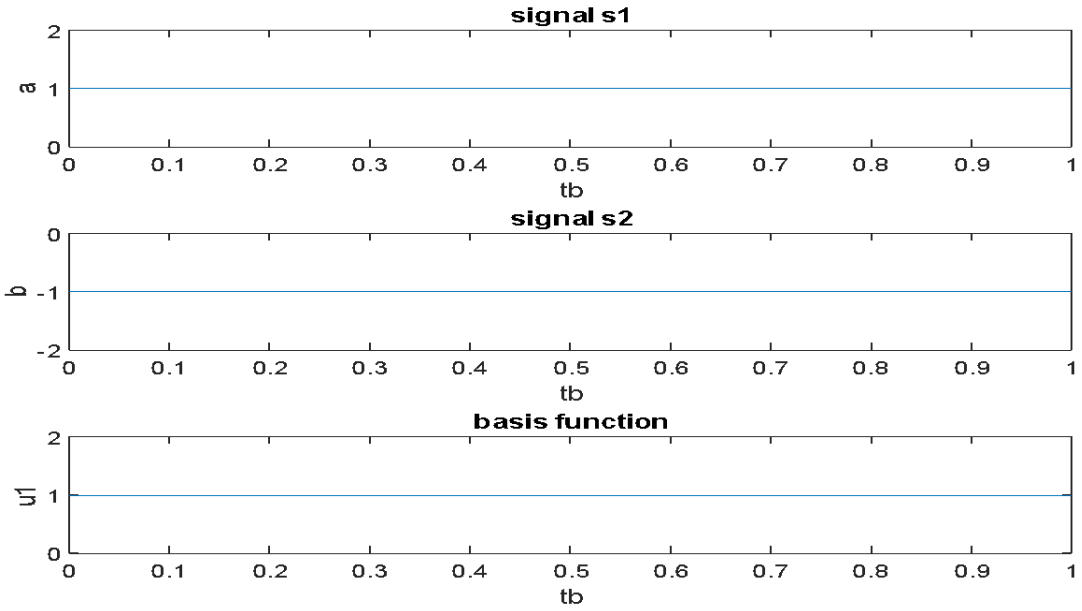
AMRITA VISHWA VIDYAPEETHAM

DIGITAL COMMUNICATION LAB

Name: INDUKURI GOWTHAM KISHORE **Roll No: AM.EN.U4ECE18504**

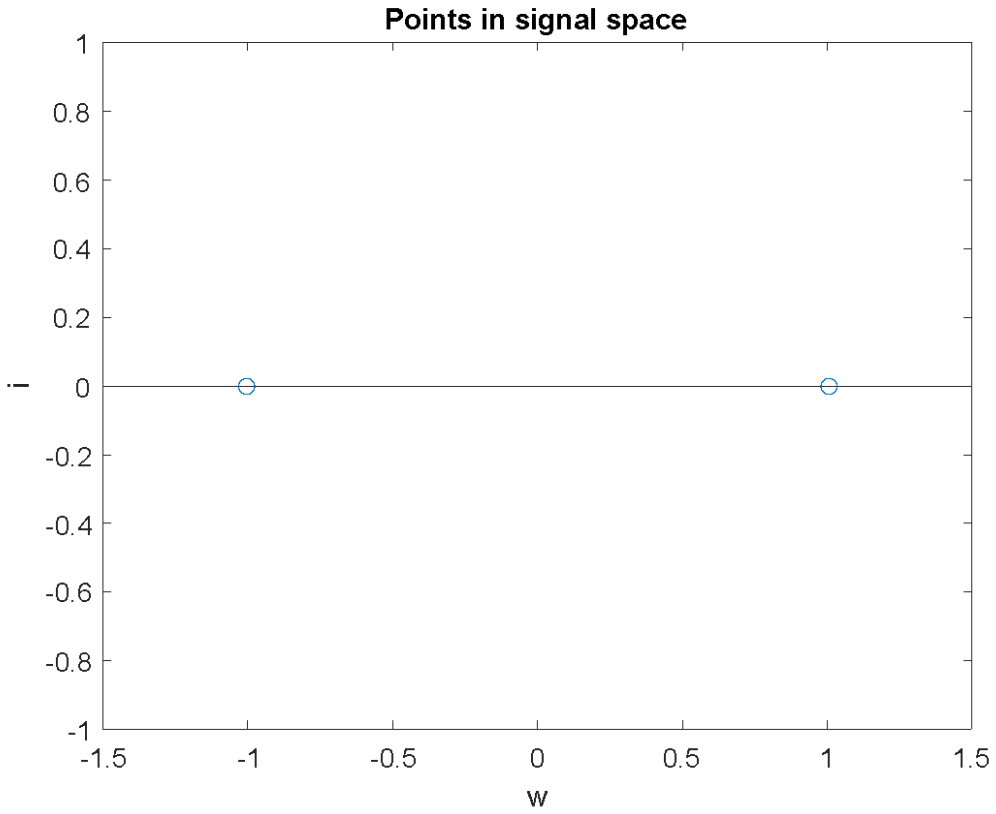
Q1) Use MATLAB to find the modulator output in Binary PAM, if the signal waveforms s1 (t) and s2 (t) are as shown in figure.

```
tb=0:0.01:1
dt=0.01
a=[ones(1,length(0:0.01:1))]
b=[-1.*ones(1,length(0:0.01:1))]
ea=sum(a.*a*dt)
u1=a./sqrt(ea)
subplot(3,1,1)
plot(tb,a)
subplot(3,1,2)
plot(tb,b)
subplot(3,1,3)
plot(tb,u1)
```



Q2) Plot these wave forms as points in signal space.

```
tb=0:0.01:1
dt=0.01
a=[ones(1,length(0:0.01:1))]
b=[-1.*ones(1,length(0:0.01:1))]
ea=sum(a.*a*dt)
u1=a./sqrt(ea)
w1=sum(u1.*a*dt)
w2=sum(u1.*b*dt)
w=[w1,w2]
i=zeros(1,length(w))
stem(w,i)
```



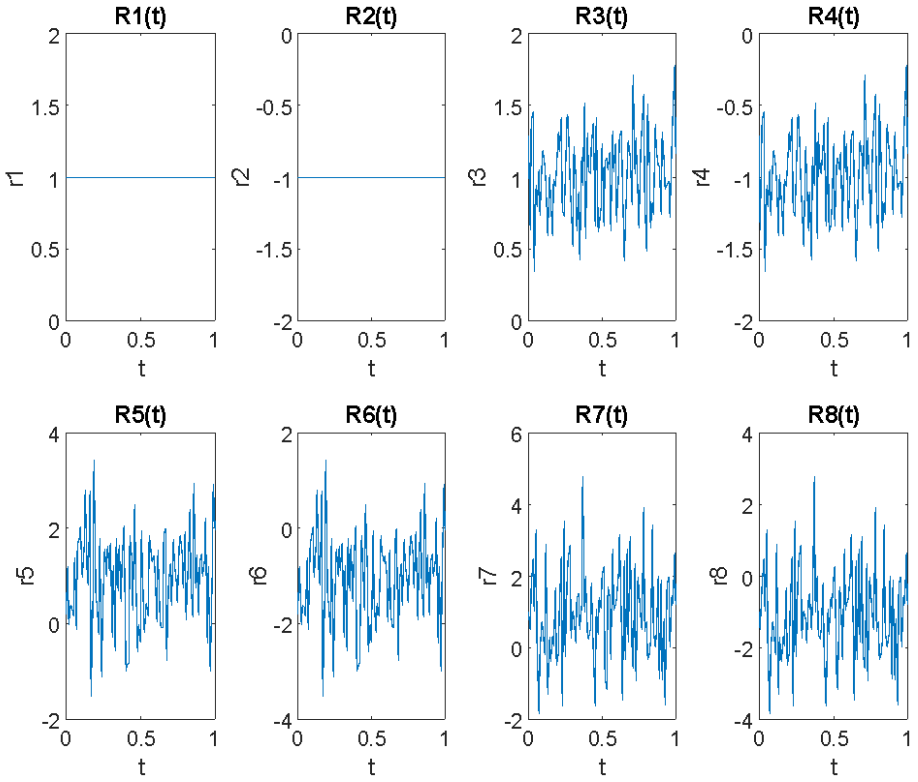
Q3) Suppose while transmission through channel, the signal was affected with AWGN with 02=σ,1.02=σ,12=σand 22=σ, to produce a signal r(t),where r(t) is the demodulator input, given by r(t) = sm(t)+n(t).and n(t) is AWGN with variances given.

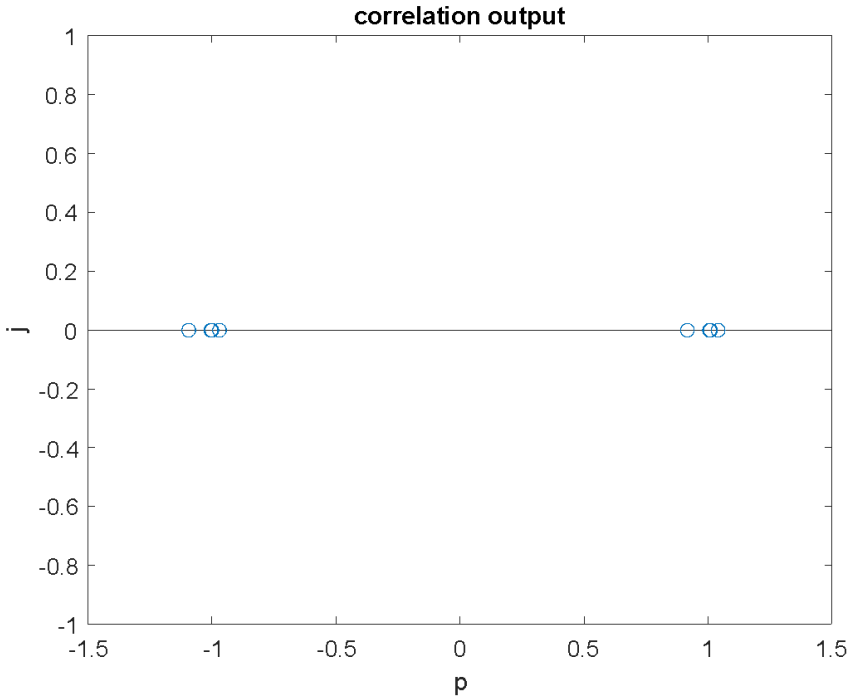
Q4)Use Correlation receiver and plot the correlator output.

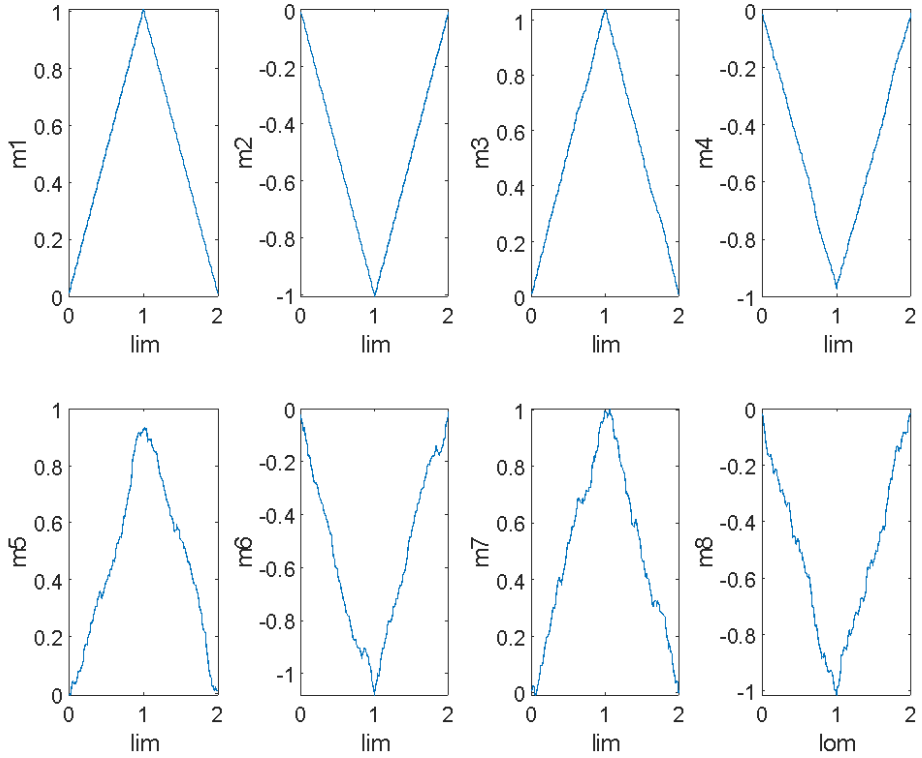
Q5)Use Matched filter to demodulate r(t) and plot the output.

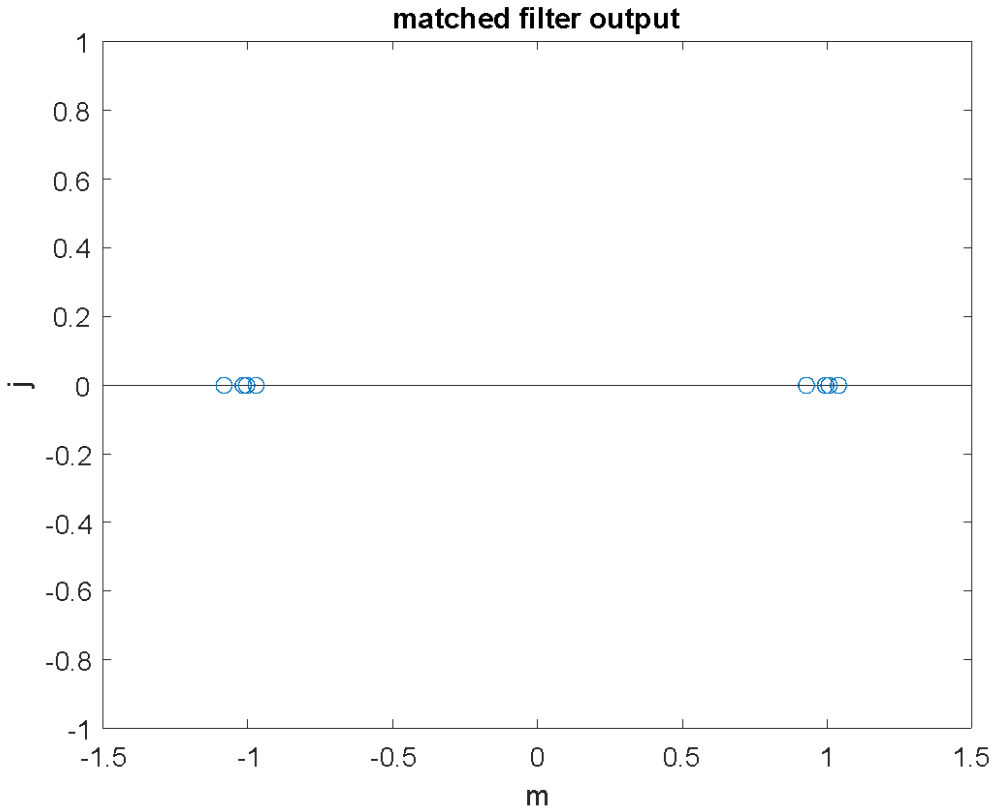
```
t=0:0.01:1;
a=[ones(1,length(0:0.01:1))];
b=[-1*ones(1,length(0:0.01:1))];
dt=0.01;
ea=sum(a.*a*dt);
u1=a./sqrt(ea);
n1=random('norm',0,0,1,length(a));
n2=random('norm',0,sqrt(0.1),1,length(a));
n3=random('norm',0,sqrt(1),1,length(a));
n4=random('norm',0,sqrt(2),1,length(a));
r1=a+n1;
r2=b+n1;
r3=a+n2;
r4=b+n2;
r5=a+n3;
r6=b+n3;
r7=a+n4;
r8=b+n4;
figure
subplot(2,4,1)
plot(t,r1)
subplot(2,4,2)
plot(t,r2)
subplot(2,4,3)
plot(t,r3)
subplot(2,4,4)
plot(t,r4)
subplot(2,4,5)
plot(t,r5)
subplot(2,4,6)
plot(t,r6)
subplot(2,4,7)
plot(t,r7)
subplot(2,4,8)
plot(t,r8)
p1=sum(r1.*u1*dt);
p2=sum(r2.*u1*dt);
p3=sum(r3.*u1*dt);
p4=sum(r4.*u1*dt);
```

```
p5=sum(r5.*u1*dt);
p6=sum(r6.*u1*dt);
p7=sum(r7.*u1*dt);
p8=sum(r8.*u1*dt);
p=[p1 p2 p3 p4 p5 p6 p7 p8];
j=zeros(1,length(p));
figure
stem(p,j)
title('correlation output')
m1=conv(r1,u1)*dt;
m2=conv(r2,u1)*dt;
m3=conv(r3,u1)*dt;
m4=conv(r4,u1)*dt;
m5=conv(r5,u1)*dt;
m6=conv(r6,u1)*dt;
m7=conv(r7,u1)*dt;
m8=conv(r8,u1)*dt;
lim=0:0.01:2;
figure
subplot(2,4,1)
plot(lim,m1)
subplot(2,4,2)
plot(lim,m2)
subplot(2,4,3)
plot(lim,m3)
subplot(2,4,4)
plot(lim,m4)
subplot(2,4,5)
plot(lim,m5)
subplot(2,4,6)
plot(lim,m6)
subplot(2,4,7)
plot(lim,m7)
subplot(2,4,8)
plot(lim,m8)
figure
m=[m1(101),m2(101),m3(101),m4(101),m5(101),m6(101),m7(101),m8(101)];
stem(m,j)
title('matched filter output')
```


R1(t)
R2(t)
R3(t)
R4(t)
R5(t)
R6(t)
R7(t)
R8(t)
r1
r2
r3
r4
r5
r6
r7
r8
t


correlation output
j
p


m1
m2
m3
m4
m5
m6
m7
m8
lim
lom


matched filter output
j
m