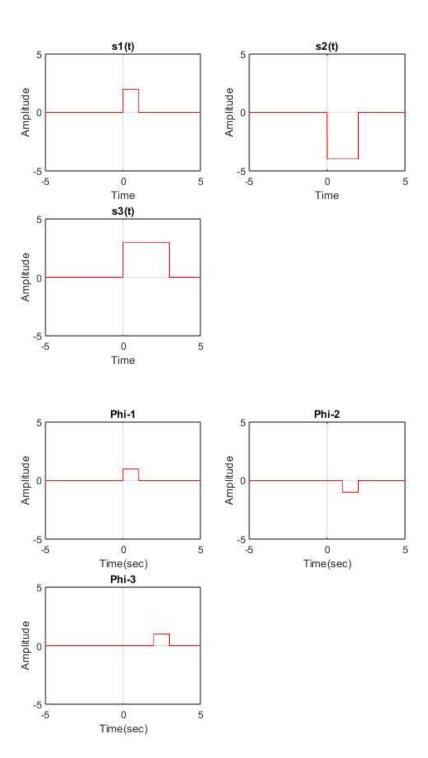
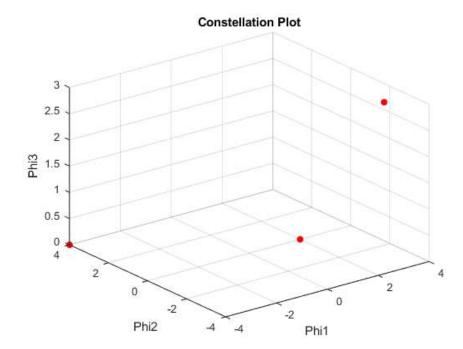
```
% Grahm-Schmidt Orthogonalization-2
% Name: Sachin Chauhan
% Roll# 23SP06007
% Course: Advanced Communication Laboratory
clc;
clear global;
close all;
syms x;
%defining time limits
t_low=0;
t_high=3;
%defining signals
s1=2*(heaviside(x)-heaviside(x-1));
s2=4*(-heaviside(x)+heaviside(x-2));
s3=3*(heaviside(x)-heaviside(x-3));
phi=[];%basis fucntion array
s=[s1,s2,s3];%signal array
% calculating basis function
for i=1:length(s)
   f_tilda=s(i);
   if i>1
       for j=1:i-1%calculating f_tilda
           f\_tilda=f\_tilda-innerProduct(phi(j),f\_tilda,t\_low,t\_high)*phi(j);
       end
   end
   % if(f_tilda~=0)
       phi=[phi f_tilda/(calc_norm(f_tilda,t_low,t_high))];%calulating phi(t) for the ith signal and appending it to the phi array
   % end
end
%storing coefficients in an array for plotting the constellation diagram
for i=1:length(s)
    for j=1:length(phi)
      if(isnan(phi(j))==0)
           points(i,j)=innerProduct(phi(j),s(i),t_low,t_high);
       end
   end
end
%plotting signals
figure(1);
for i=1:length(s)
   subplot(2,2,i);
   fplot(s(i),'r');
   xlim([-5 5]);
   ylim([-5 5]);
   grid on;
   xlabel('Time');
   ylabel('Amplitude');
   title(sprintf('s\%d(t)',i));\\
%plotting the basis functions
figure(2);
for i=1:length(phi)
   hold on;
   subplot(2,2,i);
   % fplot(f_tilda_arr(i));
   fplot(phi(i),'r');
   grid on;
   xlim([-5 5]);
   ylim([-5 5]);
   xlabel('Time(sec)');
   ylabel('Amplitude');
   title(sprintf('Phi-%d',i));
```

```
end
\mbox{\ensuremath{\mbox{\sc Mplotting}}} the constellation diagram
[row col]=size(points);
x=points(:,1);
y=points(:,2);
z=points(:,3);
figure(3);
scatter3(x,y,z,'r','filled');
xlabel('Phi1');
ylabel('Phi2');
zlabel('Phi3');
title('Constellation Plot');
grid on;
%user defined function for calculating norm
function norm=calc_norm(s,t_low,t_high)
    norm=sqrt(int(s*s,t_low,t_high));
%user defined function for calculating innerproduct of two signals
function inner_prod=innerProduct(f1,f2,t_low,t_high)
    inner_prod=int(f1*f2,t_low,t_high);
end
```





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