
Main script (Question-3)

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Basic Variables

```
td=0.01; % Time axis jump
ts=10; % Time axis limit
T=0:td:ts; % Time axis
tb=(length(T)-1)*td/20; % seperation between successive transmitted pulses
```

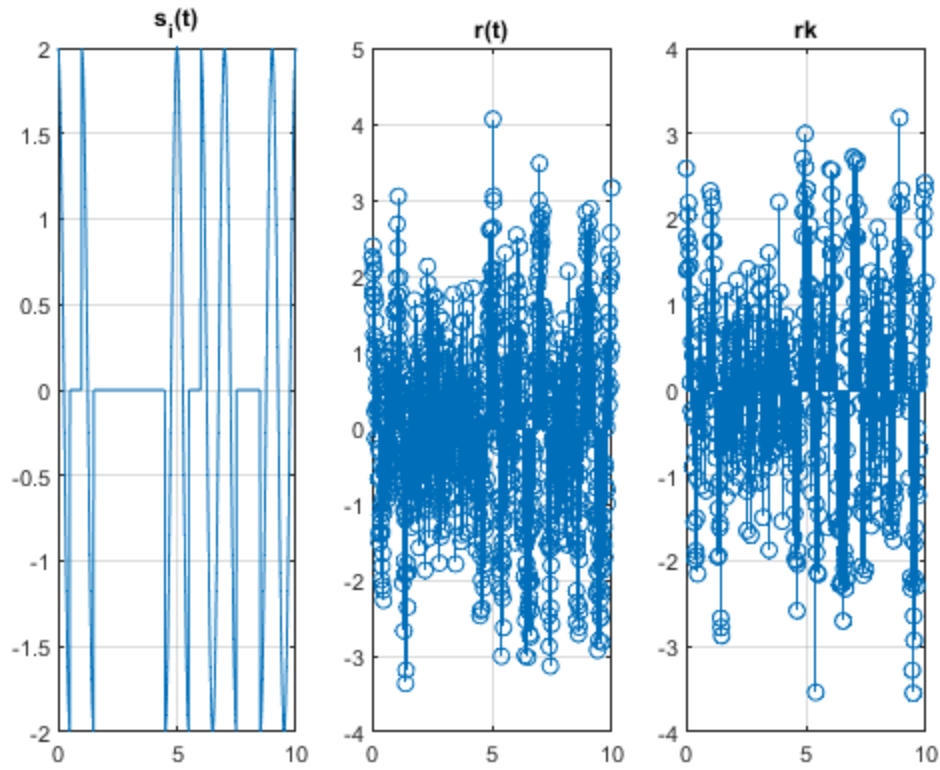
Generation Of Signal

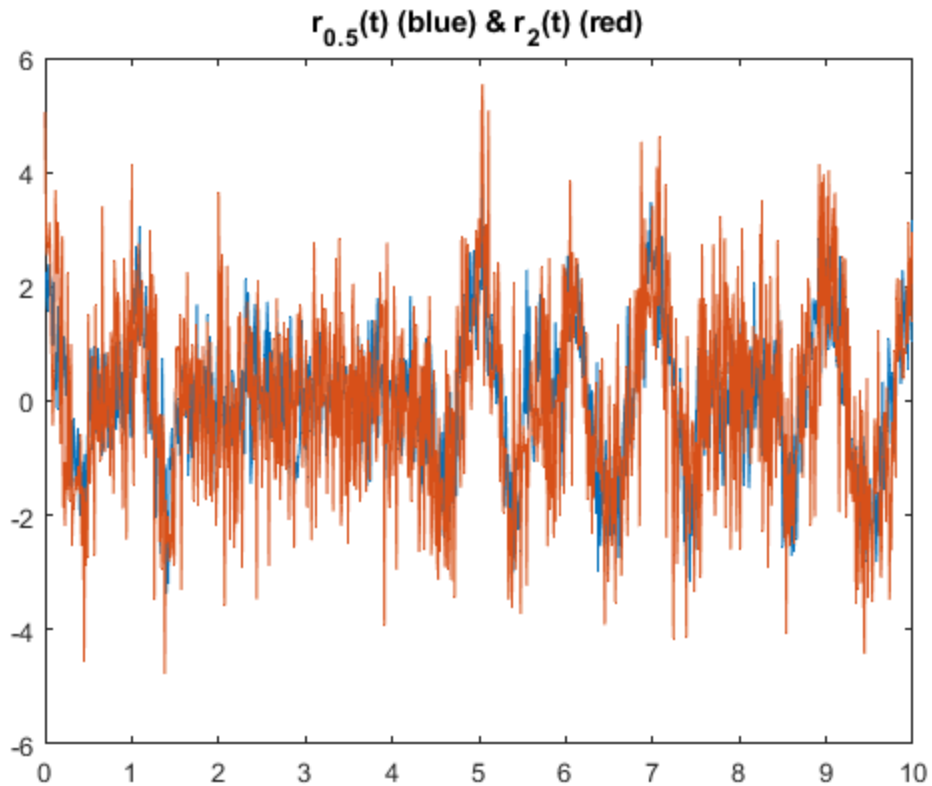
```
bits=randi([0,1],1,20);
% Generation of Bit stream (of size 20)
% Generation of Output
[si,r,r2]=pulseccoding(T,td,tb,bits,0.5); % for var = 0.5
[si1,r1,r3]=pulseccoding(T,td,tb,bits,2); % for var = 2
```

Ploting of output

```
figure('Name','Part-a');
% Part-a
subplot(1,3,1);
plot(T,si);
title("s_i(t)");
grid;
subplot(1,3,2);
stem(T,r2);
title("r(t)");
grid;
subplot(1,3,3);
stem(T,r);
title("rk");
grid;
% Part-b
```

```
figure('Name','Part-b');  
plot(T,r2);  
hold on;  
plot(T,r3);  
hold off;  
title("r_0_.5(t) (blue) & r_2(t) (red)");
```





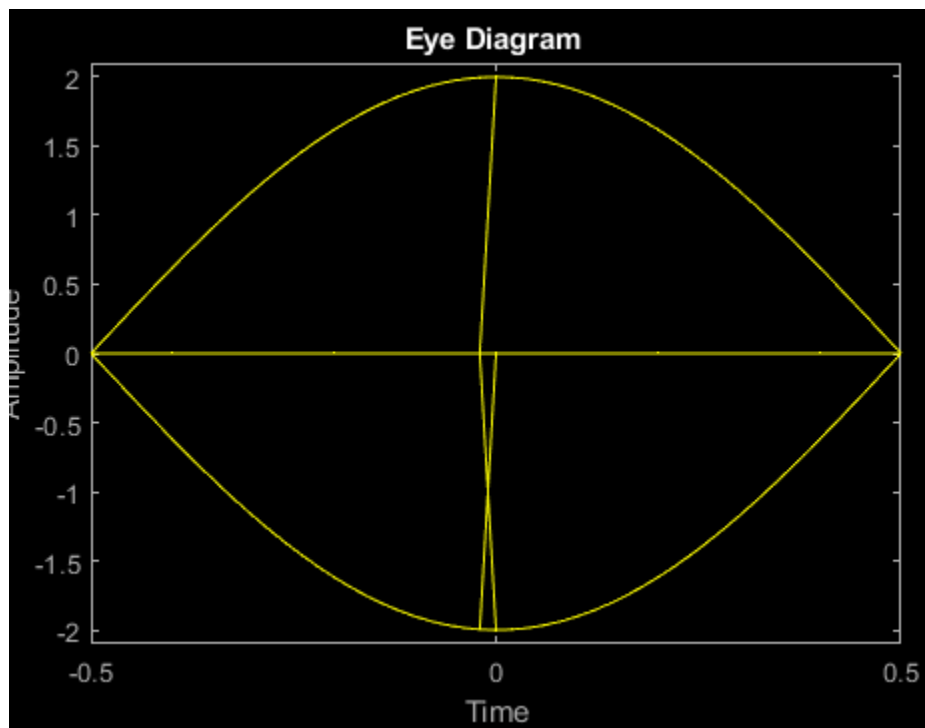
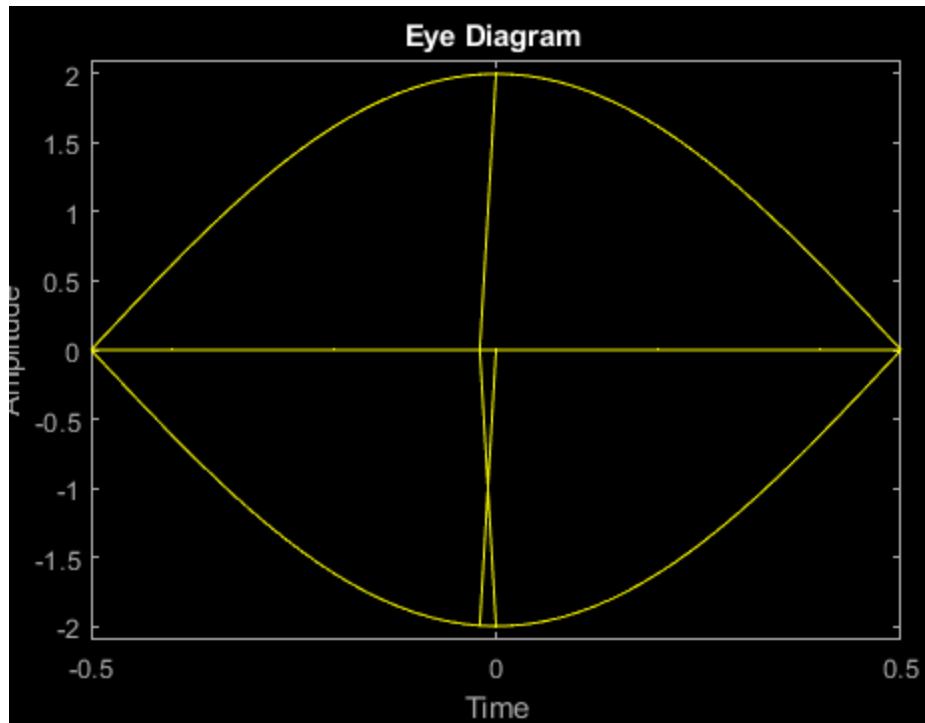
Explnation of Part-b

```
disp("We see that ar variance increases spread in of r(t) inreases");
```

We see that ar variance increases spread in of r(t) inreases

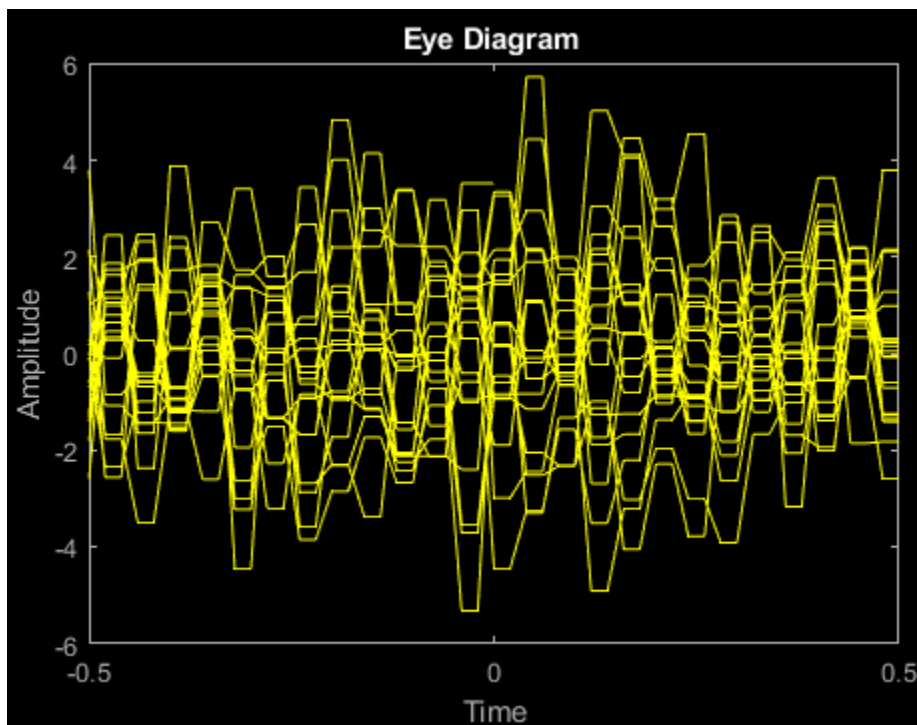
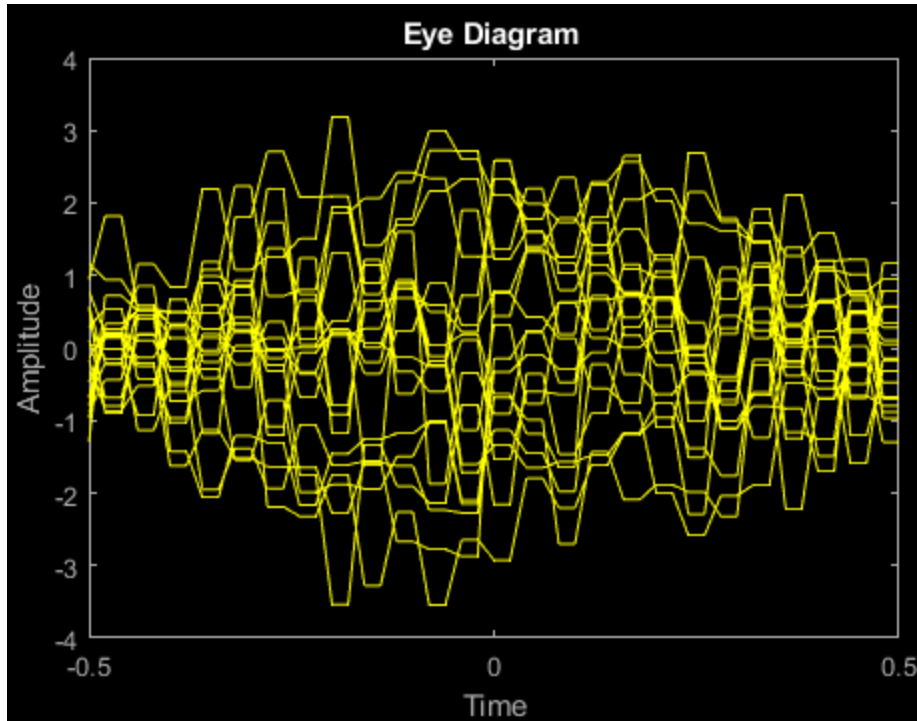
Eye Diagram of signal without noise

```
eyediagram(si,50);  
eyediagram(si1,50);
```



Eye Diagram of signal with noise

```
eyediagram(r,50);  
eyediagram(r1,50);
```



Explanation of Bonus

```
disp("We see that ar variance increases amplitude in eye diagram increas");
```

We see that ar variance increases amplitude in eye diagram increas

Function to generate output wave forms

```
function [si,r,r1]=pulsecooding(T,td,tb,bits,sigmasq)
% Logic to generate si(t)
    x=1;
    si=T;
    ak=0;
    for i = 1:length(T)
        m=(i-1)*td/tb;
        s0=2*cos(pi*m);
        if(mod(m*tb,tb)==0 && i~=length(T))
            ak=bits(x);
            x=x+1;
        end
        si(i)=s0*ak;
    end
    n1= wgn(1,tb*20/td,sigmasq,'linear'); % logic to generate noise
% logic to generate r(t)
    r1=T;
    k=1;
    for i=1:length(T)
        if mod((i-1)*td,td)==0 && i~=length(T)
            r1(i)=si(i)+n1(k);
            k=k+1;
        else
            r1(i)=r1(i-1);
        end
    end
% logic to generate r[k] (we have sampled si(t) and then added noise to it)
    Tsamp=0.02;% 50Hz
    n= wgn(1,tb*20/Tsamp,sigmasq,'linear');% logic to generate noise
    r=T;
    k=1;
    for i=1:length(T)
        if mod((i-1)*td,Tsamp)==0 && i~=length(T)
            r(i)=si(i)+n(k);
            k=k+1;
        else
            r(i)=r(i-1);
        end
    end
end
```

End of the Question

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