SAMPLING THEOREM

CODE:

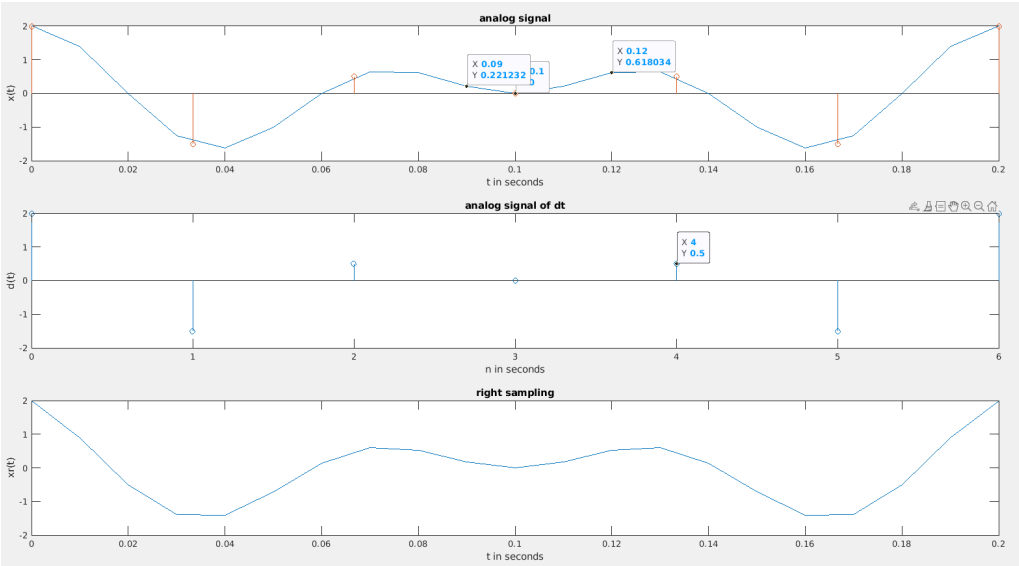
```
% sampling theorem verification
%right sampling  fs=2fm(fs is sampling frequency and fm is max frequency)
%over sampling   fs>4fm
%under sampling   fs<2fm aliasing
clc;
t=0:0.01:0.2;
f1=input('enter frequency 1: ');
f2=input('enter frequency 2: ');
xa=cos(2*pi*f1*t) + cos(2*pi*f2*t);%continuous signal
fm = max(f1,f2);
% right sampling
fs=2*fm;

%t=nT i.e continous to dectetrrtr time
ts=1/fs;%sampling interval
n = 0:1:0.2*fs;% discrete scale
xd = cos(2*pi*f1*(n*ts)) + cos(2*pi*f2*(n*ts));% discrete time signal
%xa is converted to xd by taking samples at particular intervals of time
%thus give us dt signal

subplot(3,1,1)
plot(t,xa);
xlabel('t in seconds');ylabel('x(t)');title('analog signal');hold on;
stem(n*ts,xd);%to put points on the ct signal
hold off;

subplot(3,1,2)
stem(n,xd);
xlabel('n in seconds');ylabel('d(t)');title('analog signal of dt');
xr=xd*sinc((t-(n'*ts))/ts);

subplot(3,1,3)
plot(t,xr);
xlabel('t in seconds');ylabel('xr(t)');title('right sampling');
%interpolation to get back the xa by multiplying the sampled signal xd by sync function
%thus verification can happen if xa = xr i.e right sampling has taken place
```


analog signal
X 0.09
Y 0.221232
X 0.12
Y 0.618034
x(t)
t in seconds
analog signal of dt
X 4
Y 0.5
d(t)
n in seconds
right sampling
xr(t)
t in seconds