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Section-2

Lab-06

Analytical Part

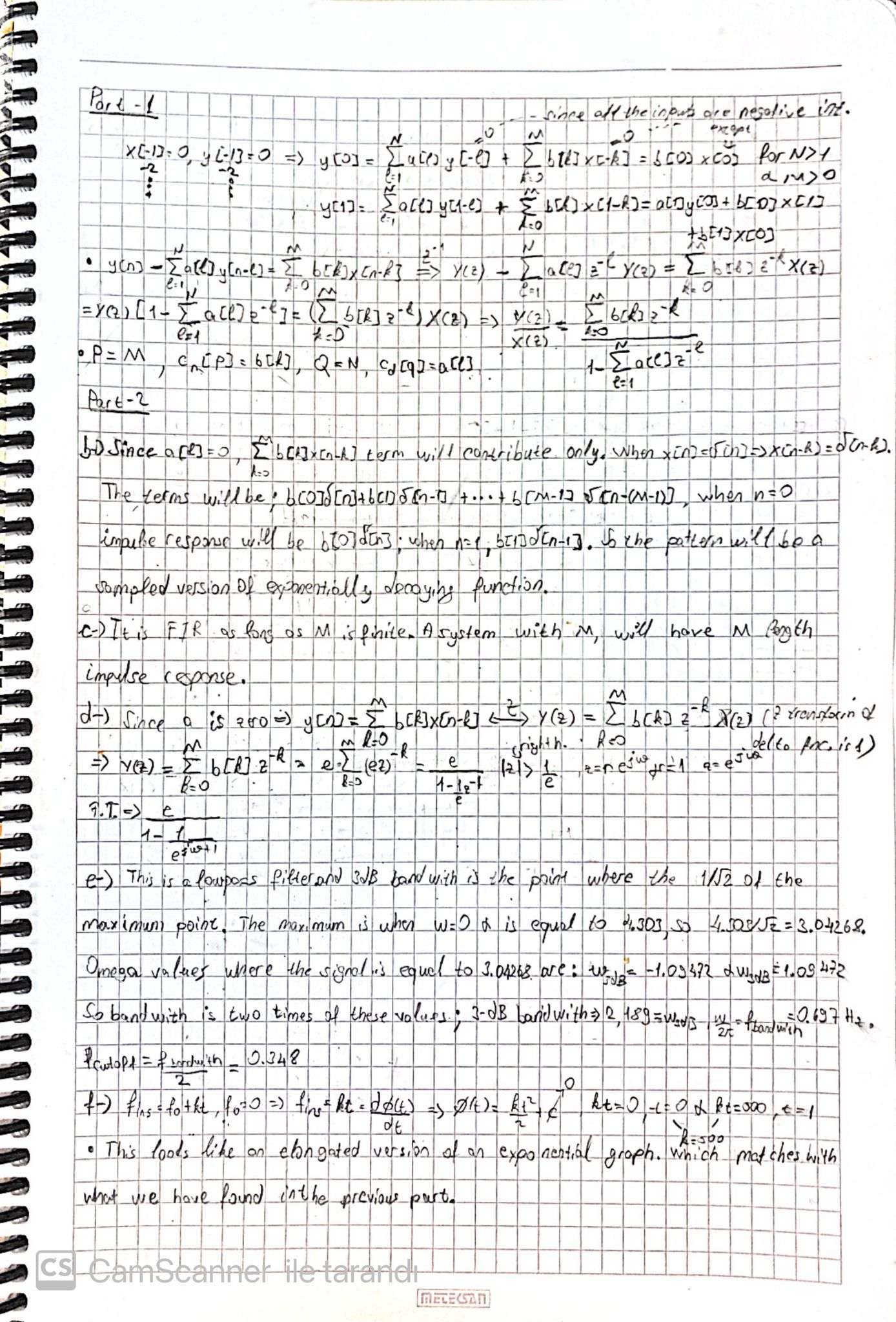


Figure 1- Analytical Part 1

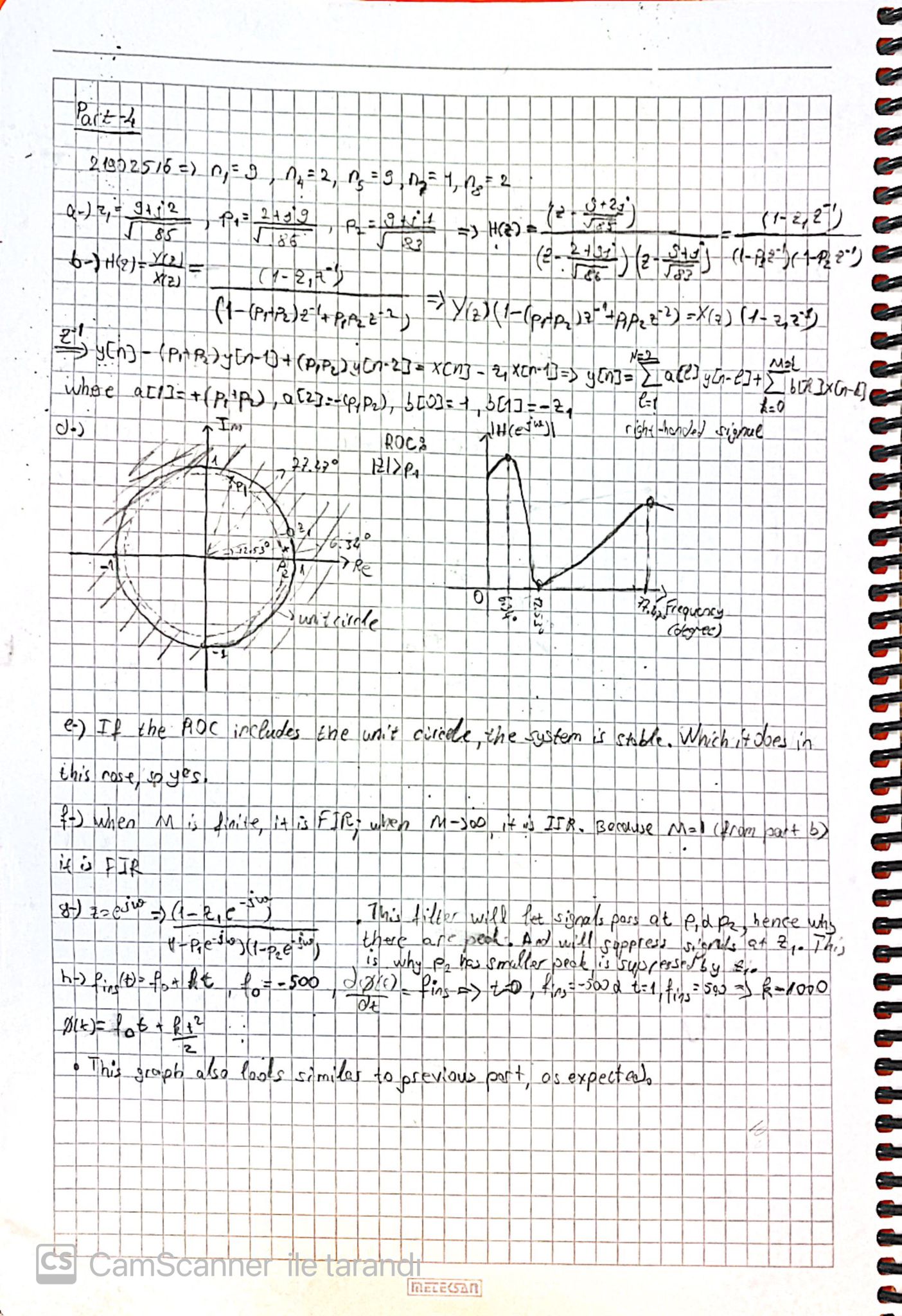


Figure 2- Analytical Part 2

Plots

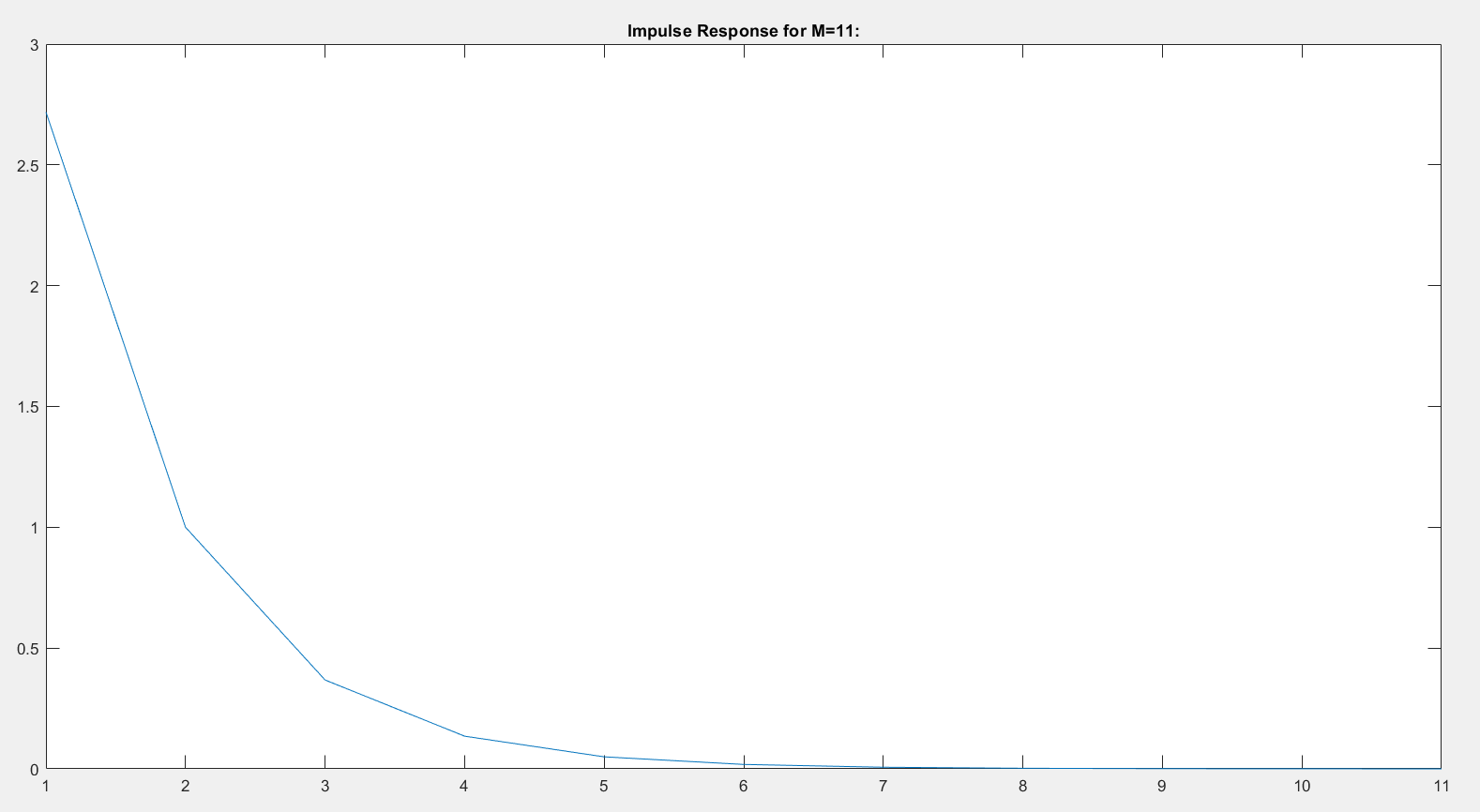


Figure 3- Impulse Response

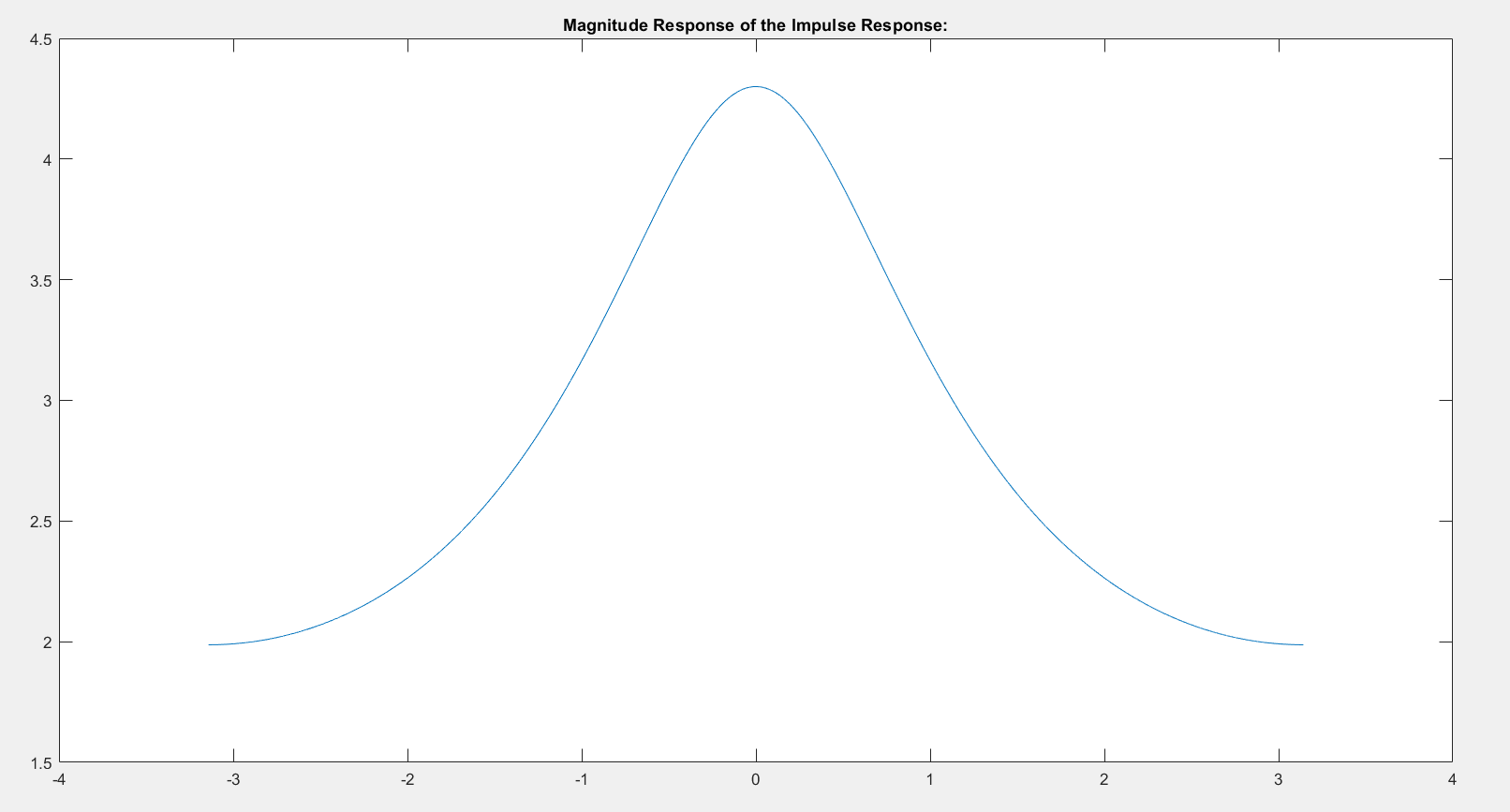


Figure 4- Magnitude Response of Impulse Response

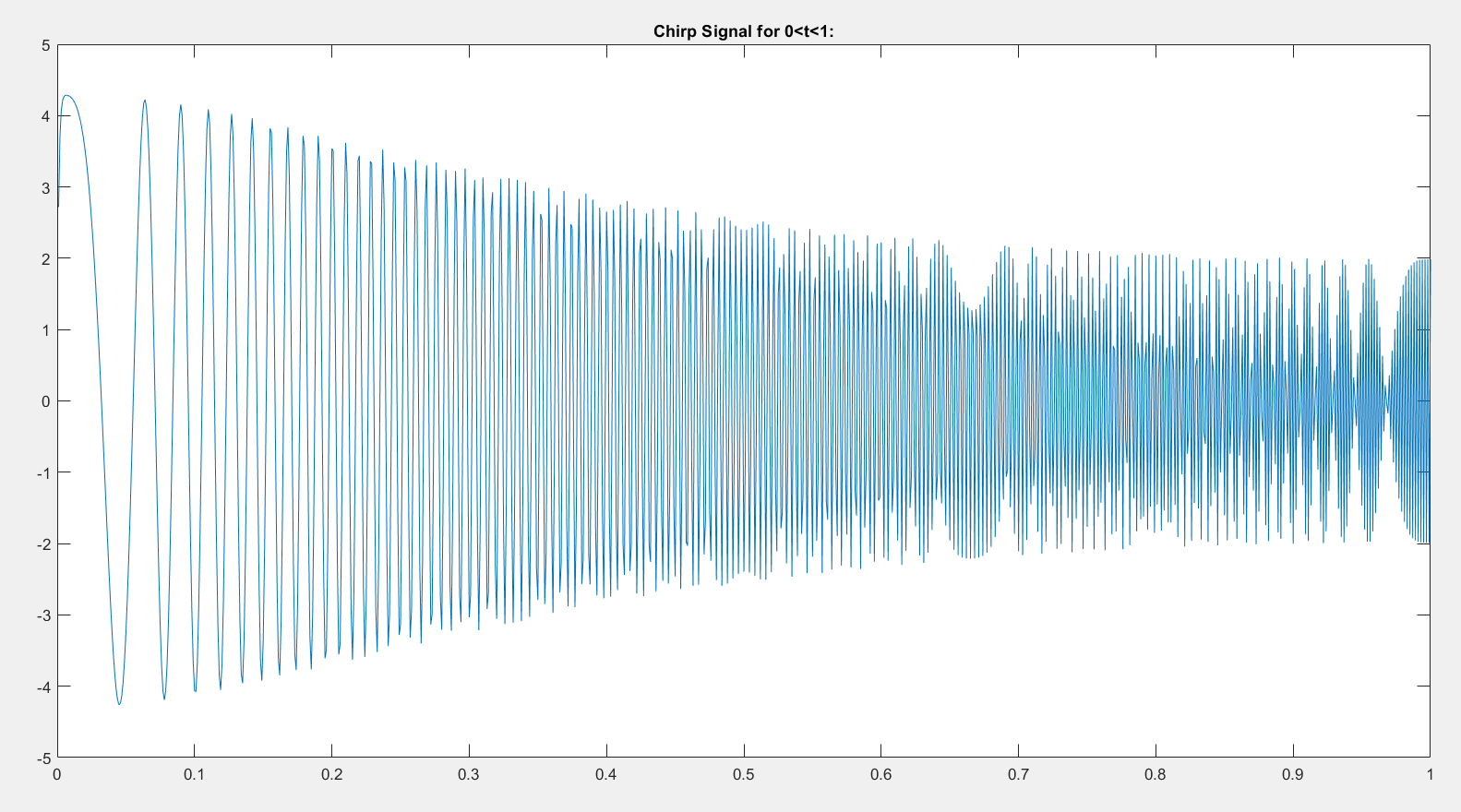


Figure 5- Chirp Signal 1

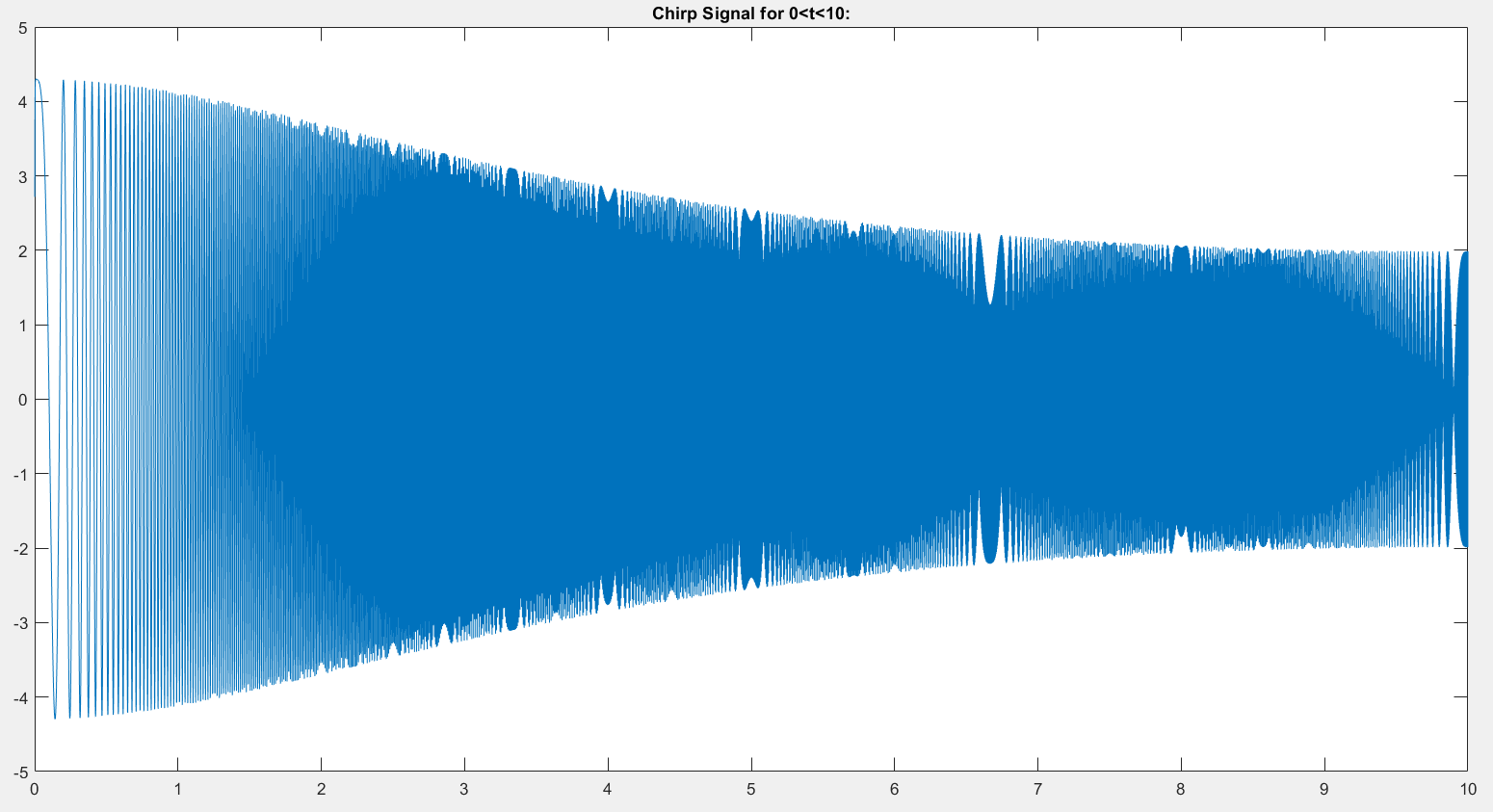


Figure 6- Chirp Signal 2

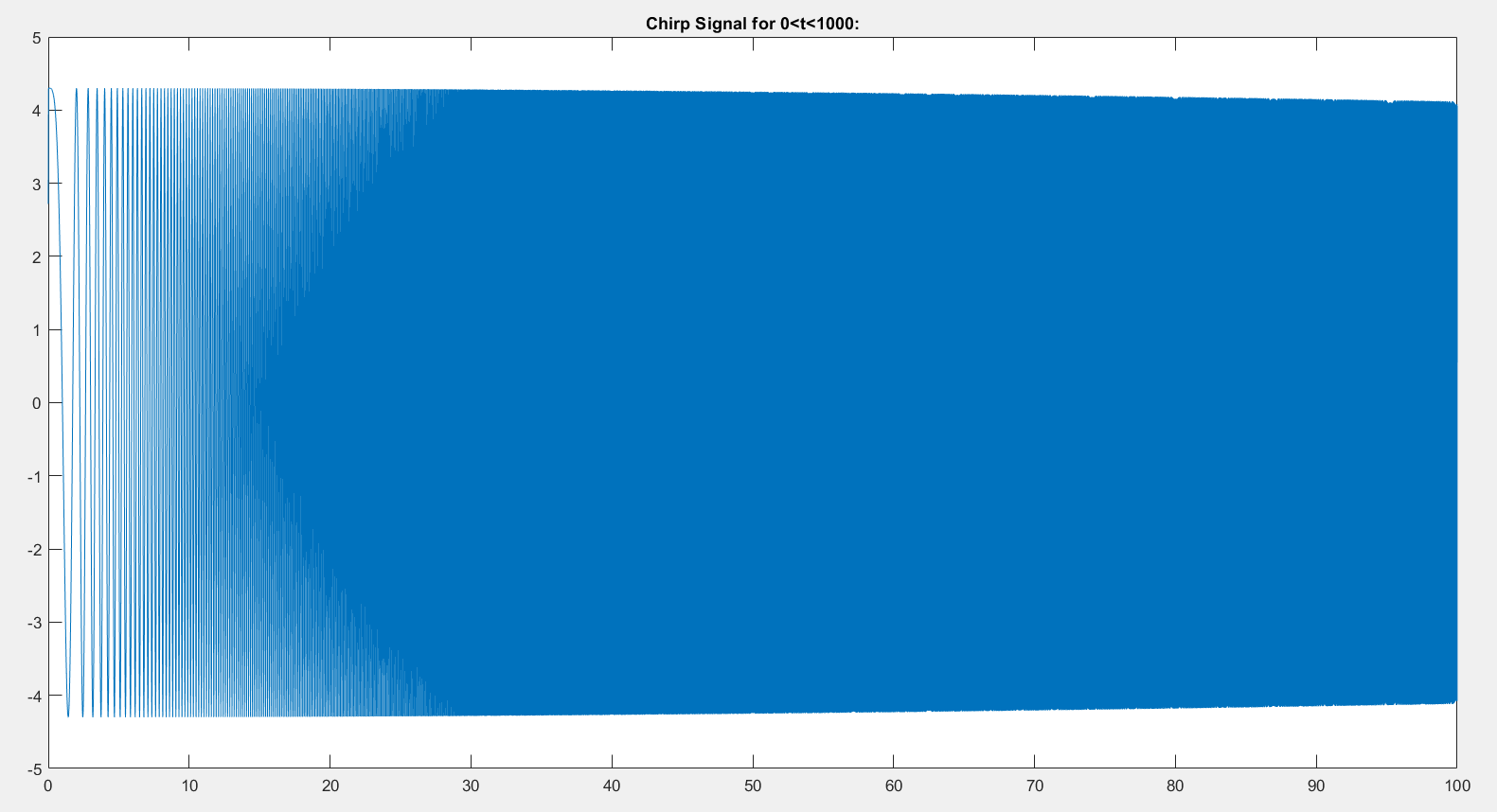


Figure 7- Chirp Signal 3

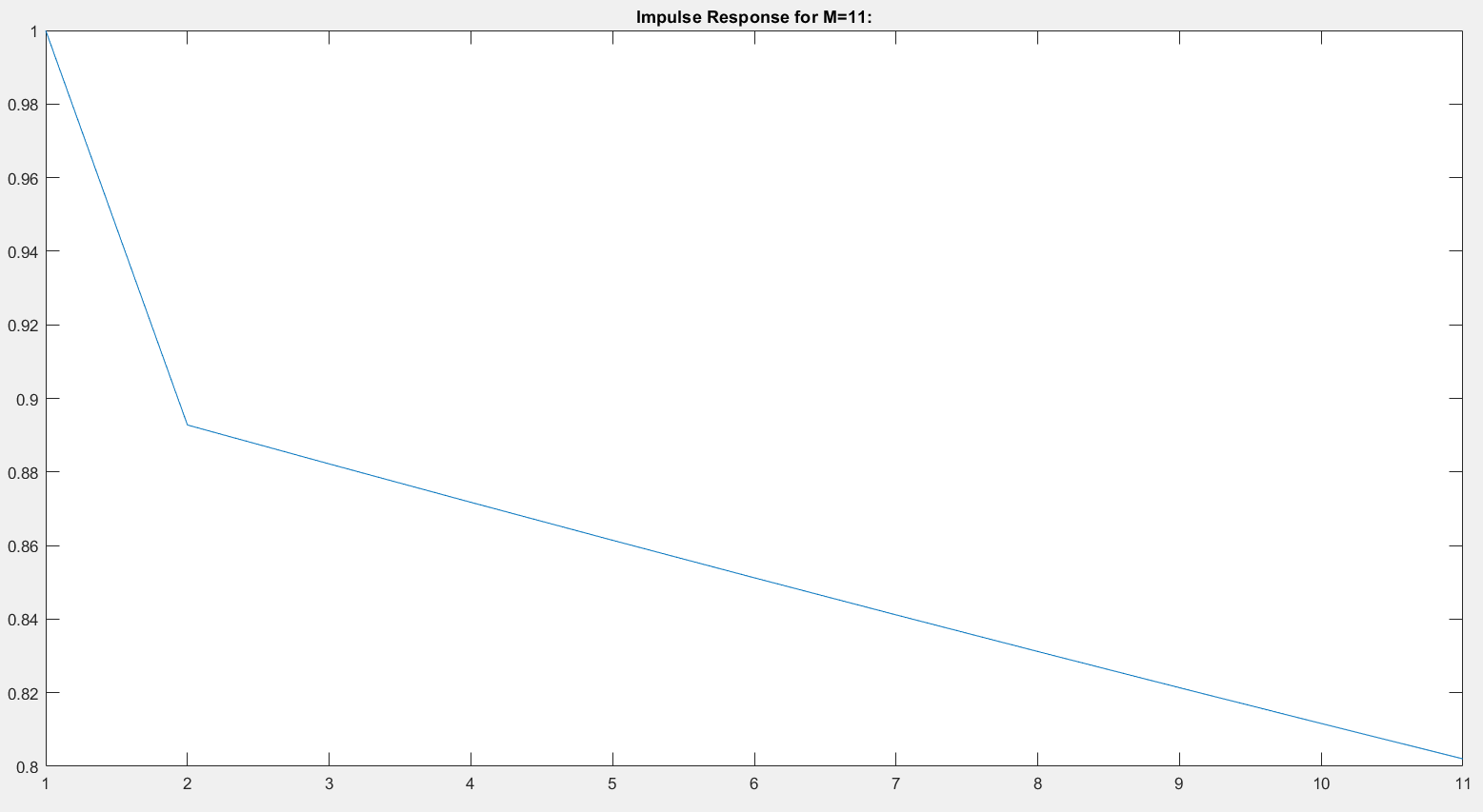


Figure 8- Impulse Response of Part 4

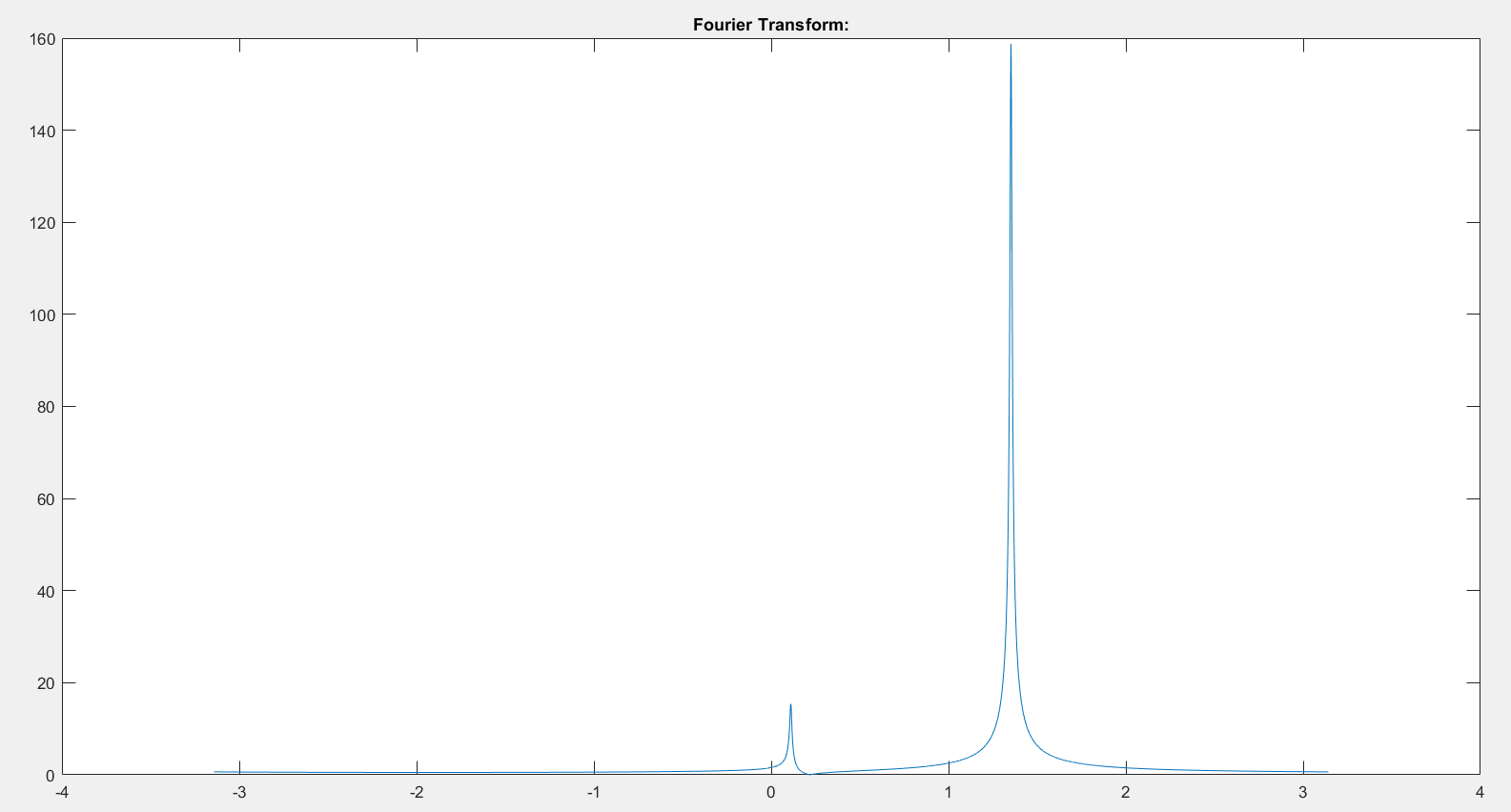


Figure 9- Fourier Transform Magnitude Plot

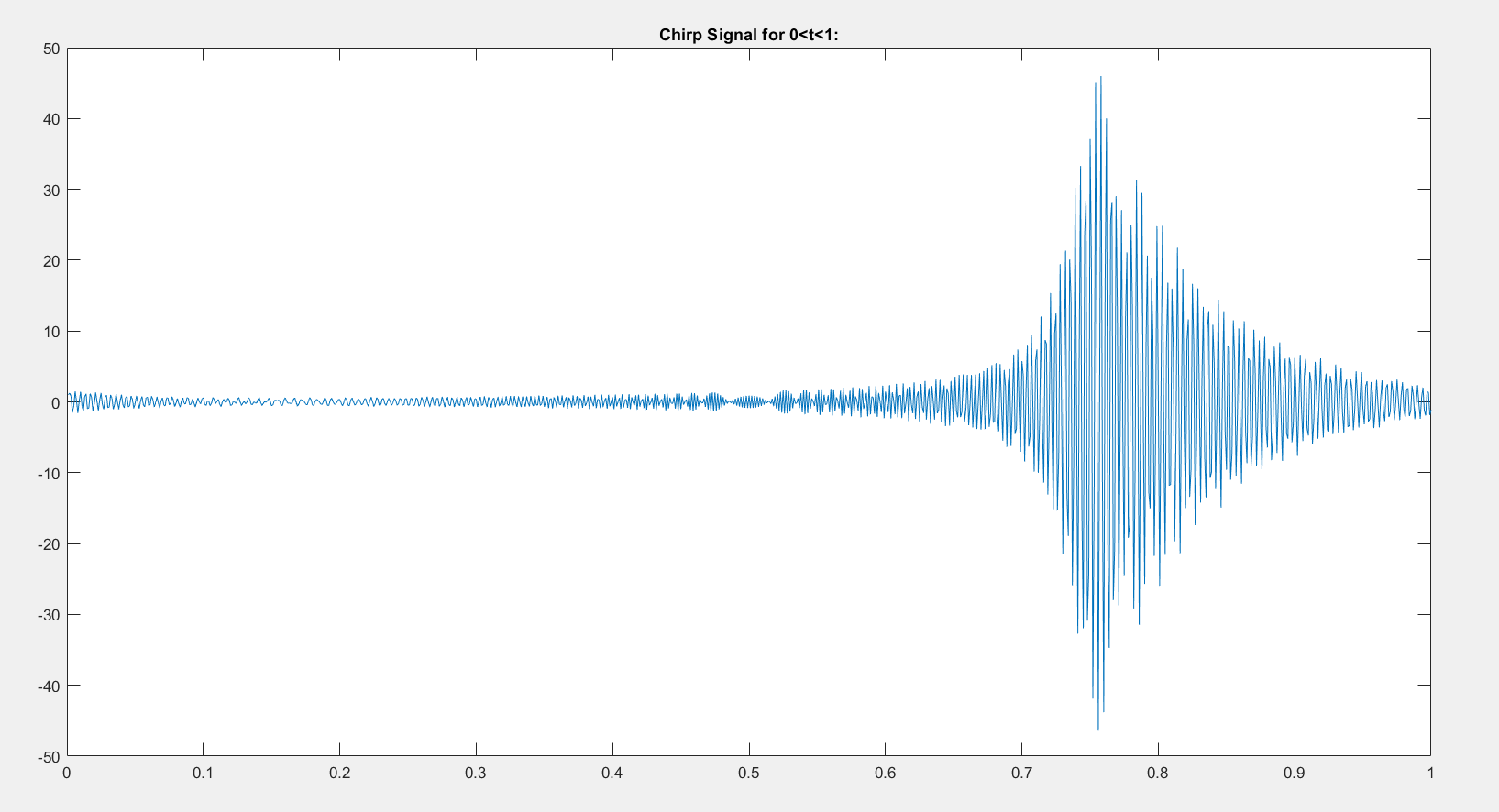


Figure 10- Chirp Signal 1

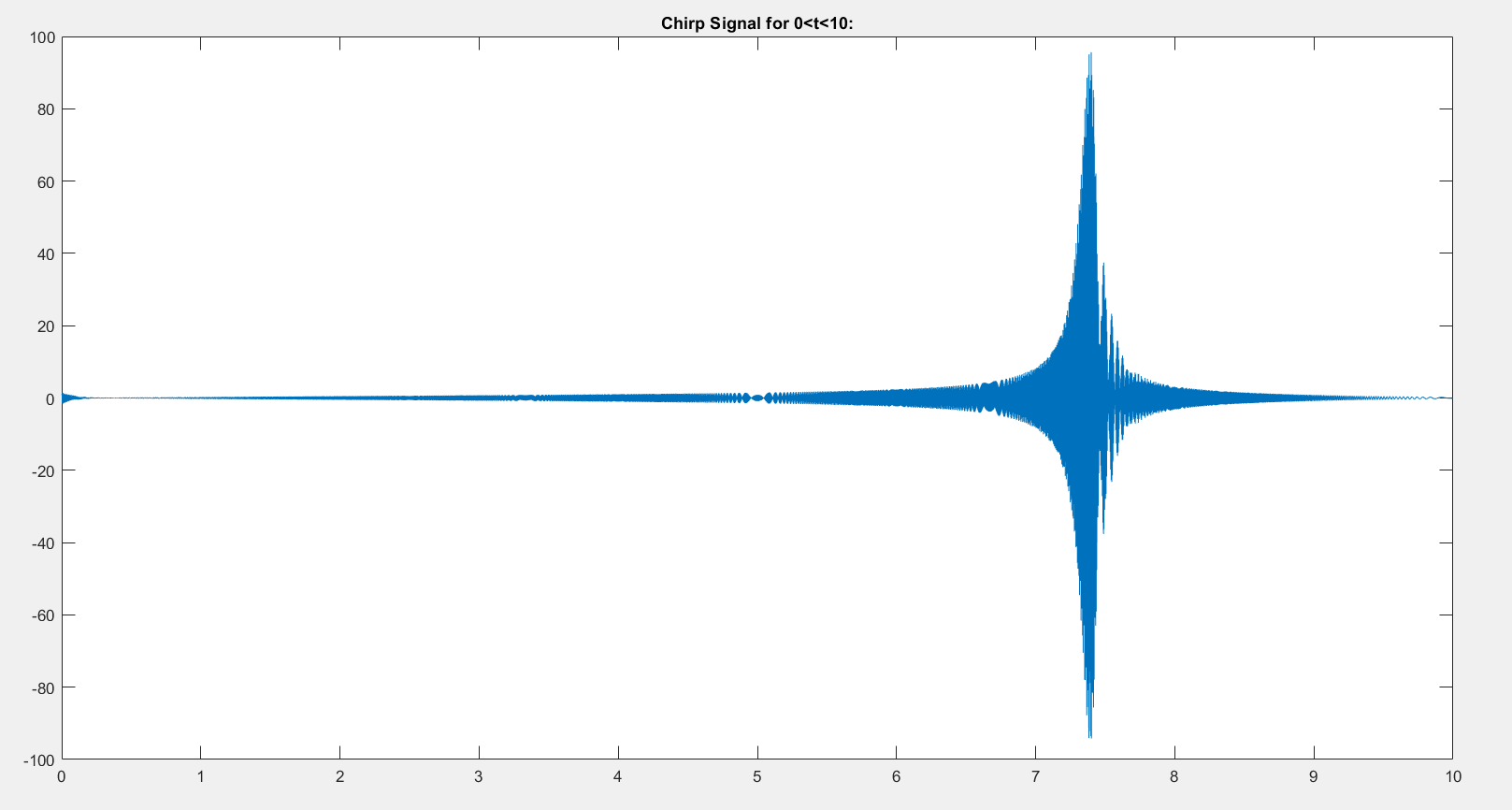


Figure 11- Chirp Signal 2

MATLAB Code

M=11;

a=zeros(1,11);

b=[];

for l=1:M

newval=exp(-1\*(l-1)+1);

b(l)=newval;

end

x\_init0=1:11;

y0=[];

y0=DTLTI(a,b,[1 0 0 0 0 0 0 0 0 0 0],11);

figure(1)

plot(x\_init0,y0)

title('Impulse Response for M=11:')

figure(2)

omega=-1\*pi:1/8192:pi;

mag\_imp=exp(1)./(1-exp(-1i\*omega-1));

plot(omega,abs(mag\_imp))

title('Magnitude Response of the Impulse Response:')

figure(3)

x\_t=0+0.001:1/1000:1;

k=500;

a=zeros(1,length(x\_t));

M=length(x\_t);

for l=1:M

newval=exp(-1\*(l-1)+1);

b(l)=newval;

end

x\_t0=cos(pi\*k\*(x\_t).^2);

y\_chirp=DTLTI(a,b,x\_t0,length(x\_t));

plot(x\_t,y\_chirp)

title('Chirp Signal for 0<t<1:')

figure(4)

x\_t=0+0.001:1/1000:10;

k=50;

a=zeros(1,length(x\_t));

M=length(x\_t);

for l=1:M

newval=exp(-1\*(l-1)+1);

b(l)=newval;

end

x\_t0=cos(pi\*k\*(x\_t).^2);

y1\_chirp=DTLTI(a,b,x\_t0,length(x\_t));

plot(x\_t,y1\_chirp)

title('Chirp Signal for 0<t<10:')

figure(5)

x\_t=0+0.001:1/1000:1000;

k=1/2;

a=zeros(1,length(x\_t));

M=length(x\_t);

for l=1:M

newval=exp(-1\*(l-1)+1);

b(l)=newval;

end

x\_t0=cos(pi\*k\*(x\_t).^2);

y2\_chirp=DTLTI(a,b,x\_t0,length(x\_t));

plot(x\_t,y2\_chirp)

title('Chirp Signal for 0<t<1000:')

figure(6)

x\_init1=1:11;

a1=[((2+9i)/sqrt(86)+(9+1i)/sqrt(83)) -((2+9i)/sqrt(86)\*(9+1i)/sqrt(83)) 0 0 0 0 0 0 0 0 0];

b1=[1 -(9+2i)/sqrt(85) 0 0 0 0 0 0 0 0 0];

y1=DTLTI(a1,b1,[1 0 0 0 0 0 0 0 0 0 0],11);

plot(x\_init1,abs(y1))

title('Impulse Response for M=11:')

figure(7)

mag\_sec=(1-(9+2i)\*exp(-1i\*omega)/sqrt(85))./((1-(2+9i)\*exp(-1i\*omega)/sqrt(86)).\*(1-(9+1i)\*exp(-1i\*omega)/sqrt(83)));

plot(omega,abs(mag\_sec))

title('Fourier Transform:')

figure(8)

x\_t=0+0.001:1/1000:1;

k=1000;

a1=zeros(1,length(x\_t));

a1(1)=((2+9i)/sqrt(86)+(9+1i)/sqrt(83));

a1(2)=-((2+9i)/sqrt(86)\*(9+1i)/sqrt(83));

b1=zeros(1,length(x\_t));

b1(1)=1;

b1(2)=-(9+2i)/sqrt(85);

x\_t0=exp(1i\*2\*pi\*k\*(1/2\*(x\_t).^2+-500\*x\_t));

y3\_chirp=DTLTI(a1,b1,x\_t0,length(x\_t));

plot(x\_t,y3\_chirp)

title('Chirp Signal for 0<t<1:')

figure(9)

x\_t=0+0.001:1/1000:10;

k=100;

a1=zeros(1,length(x\_t));

a1(1)=((2+9i)/sqrt(86)+(9+1i)/sqrt(83));

a1(2)=-((2+9i)/sqrt(86)\*(9+1i)/sqrt(83));

b1=zeros(1,length(x\_t));

b1(1)=1;

b1(2)=-(9+2i)/sqrt(85);

x\_t0=exp(1i\*2\*pi\*k\*(1/2\*(x\_t).^2+-500\*x\_t));

y4\_chirp=DTLTI(a1,b1,x\_t0,length(x\_t));

plot(x\_t,y4\_chirp)

title('Chirp Signal for 0<t<10:')

figure(10)

x\_t=0+0.001:1/1000:1000;

k=1;

a1=zeros(1,length(x\_t));

a1(1)=((2+9i)/sqrt(86)+(9+1i)/sqrt(83));

a1(2)=-((2+9i)/sqrt(86)\*(9+1i)/sqrt(83));

b1=zeros(1,length(x\_t));

b1(1)=1;

b1(2)=-(9+2i)/sqrt(85);

x\_t0=exp(1i\*2\*pi\*k\*(1/2\*(x\_t).^2+-500\*x\_t));

y5\_chirp=DTLTI(a1,b1,x\_t0,length(x\_t));

plot(x\_t,y5\_chirp)

title('Chirp Signal for 0<t<1000:')

function y=DTLTI(a,b,x,Ny)

y=zeros(1,Ny);

N=1:Ny;

T0=(1==N);

T=(2<=N & N<=Ny);

y(T0)=b(T0).\*x(T0);

if Ny> 1

for Ny=1:Ny

n=Ny-1;

x\_holder=0;

y\_holder=0;

for initializer=[1:Ny]

initializer0=n-initializer+2;

x\_holder=x\_holder+b(initializer).\*x(initializer0);

end

if n==1

y\_holder=a(1).\*y(1);

else

for initializer=[1:Ny-1]

initializer0=n-initializer+2;

y\_holder=y\_holder+a(initializer).\*y(initializer0);

end

end

y(N==n+1)=x\_holder+y\_holder;

end

end

end