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Innhold

1 Appendix A

```
%% oppgave
wp=0.3*pi;
ws=0.5*pi;
Ap=0.5;
As=50;
deltap=(10^(Ap/20)-1)/(10^(Ap/20)+1);
deltas=(1+deltap)/(10^(As/20));
delta=min(deltap,deltas);
A=-20*log10(delta);
DeltaW=ws-wp;
omegac=(wp+ws)/2;

%% hamming
L=ceil(6.6*pi/DeltaW);
M=L;
n=0:M;
hd=ideallp(omegac,M);
tmp=hamming(L)';
h=hd.*tmp;


%% kaiser
L=ceil(6.6*pi/DeltaW);
M=L;
n=0:M;
hd=ideallp(omegac,M);
tmp= kaiser(L)';
h=(hd.*tmp);

%wvtool(h)
%fvtool(h);



%% plots

wvtool(h)

figure();
stem(h)

figure()
tmp=linspace(-pi,pi,10000);
pl=fftshift(fft(h,length(tmp)));
plp=abs(pl(tmp>=wp));
pls=abs(pl(tmp<=wp & tmp>=0));
plot(tmp/pi,20*log10(abs(pl)));
hold on;
plot(tmp(tmp>=wp)/pi,20*log10(plp));
plot(tmp(tmp<=ws & tmp>=0)/pi,20*log10(pls));

hold off;

figure()
%[Ax,H1,H2]=plotyy( tmp(tmp>=wp)/pi, 20*log10(plp) , tmp(tmp<=ws &
```

```
    tmp>=0)/pi , 20*log10(pls) );
56
57
58
59
60
61
62 %% oppgave 2
63 wp=0.5*pi;
64 ws=0.3*pi;
65 Ap=0.001;
66 As=50;
67 deltap=(10^(Ap/20)-1)/(10^(Ap/20)+1);
68 deltas=(1+deltap)/(10^(As/20));
69 delta=min(deltap,deltas);
70 A=-20*log10(delta);
71 DeltaW=ws-wp;
72 omegac=(wp+ws)/2;
73
74 %manuel
75 f0=[ws wp]/pi;
76 a=[0 1];
77 dev=[deltas deltap];
78 [M wN beta type]=kaiserord(f0,a,dev);
79 n=(0:M);
80
81 hd=ideallp(omegac,M+1);
82 tmp=kaiser(M+1,beta);
83 h=hd .* tmp';
84
85 %fir funksjon
86 % M=M+1;
87 % L=L+1;
88 % f0=[ws wp]/pi;
89 % a=[0 1];
90 % h=fir1(M,f0,a,kaiser(L));
91 % k=(0:M);
92
93
94
95
96
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110
111
```

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112
113
114
115
116
117
118 %% oppgave 3
119 clear all
120 M=61;
121 L=M+1;
122
123 alpha=M/2;
124 n=(0:M);
125 hd=cos(pi*(n-alpha))./(n-alpha)-sin(pi*(n-alpha))/pi./(n-alpha).^2;
126 h=hd.*blackman(M+1).';
127
128 figure()
129 subplot(1,2,1)
130 stem(n,h)
131 tmp=linspace(-pi,pi,1000);
132 pl=fftshift(fft(h,length(tmp)));
133 subplot(1,2,2);
134 plot(tmp,abs(pl))
135 xlim([0 pi]);
136 hold on;
137 plot(tmp,abs(1i*tmp.*exp(-1i*tmp*alpha)))
138 hold off;
139
140
141 s1=cos(2*pi*2*n/L);
142 s2=n.^2;
143 s3=cos(2*pi*2.*n/L*2.*n/L);
144 s1c=conv(s1,h);
145 s2c=conv(s2,h);
146 s3c=conv(s3,h);
147
148 figure()
149 subplot(1,2,1)
150 plot(s1)
151 subplot(1,2,2)
152 plot(s1c)
153
154 figure()
155 subplot(1,2,1)
156 plot(s2)
157 subplot(1,2,2)
158 plot(s2c)
159
160 figure()
161 subplot(1,2,1)
162 plot(s3)
163 subplot(1,2,2)
164 plot(s3c)
165
166
167 %% oppgave 4
168 clear all
```

```
wp=0.8*pi;
ws=0.6*pi;
Ap=1;
As=50;
deltap=(10^(Ap/20)-1)/(10^(Ap/20)+1);
deltas=(1+deltap)/(10^(As/20));
delta=min(deltap,deltas);

M=33;
L=34;

a=2*pi/M;
tmp=(0:L/2-1)*a;
pls=tmp(tmp<=ws);
plp=tmp(tmp>=wp);
plPS=tmp(tmp>ws & tmp<wp);
b=0*tmp;
b(tmp<=ws)=0;
b(tmp>=wp)=1;
b(tmp>ws & tmp<wp)=(plPS-ws)*(1/(wp-ws));


%fir funksjon
% M=34;
% L=35;
% h=fir2(M,[tmp/pi 1],[b 1],hamming(L));
% k=(0:M);

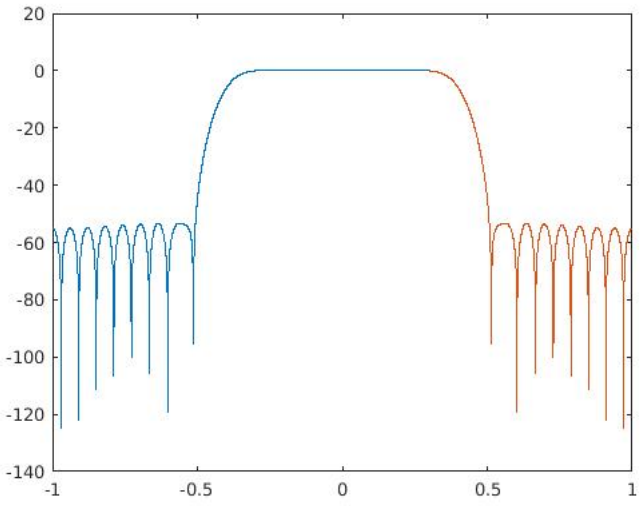
%manuelt
k=(0:M);
phase=pi/2-2*pi*k*M/(2*L);
magnitude=[b fliplr(b)];
h=magnitude.*exp(1i*phase);
h=real(ifft(h));



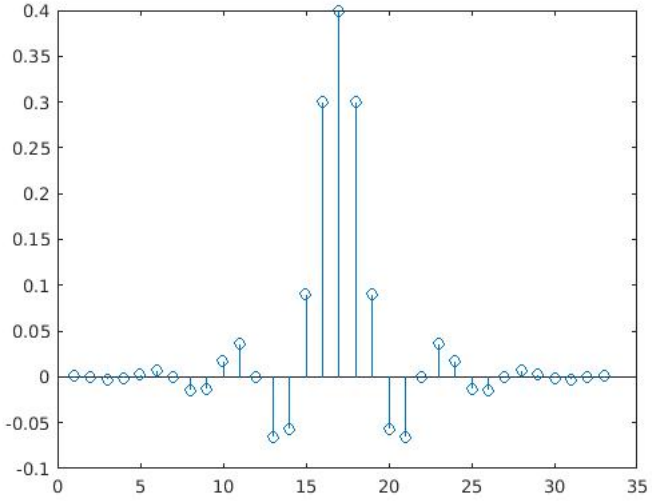
wvtool(h)
figure()
stem(h)
```

2 Oppgave 1

2.1 hamming

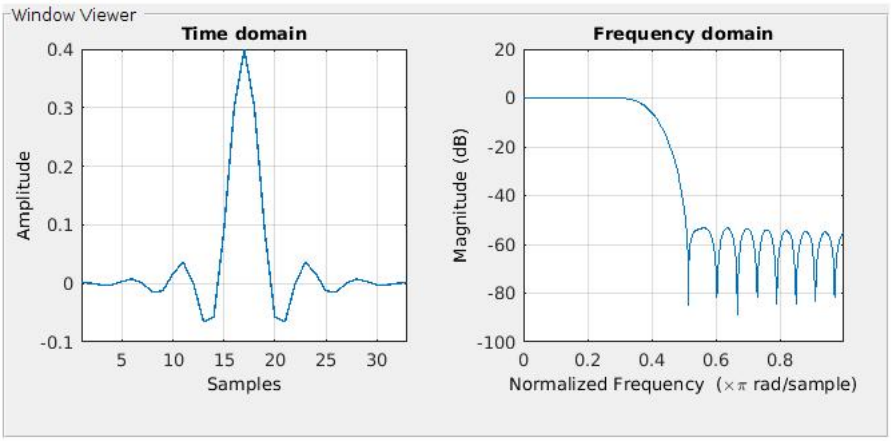


Figur 1: oppg1



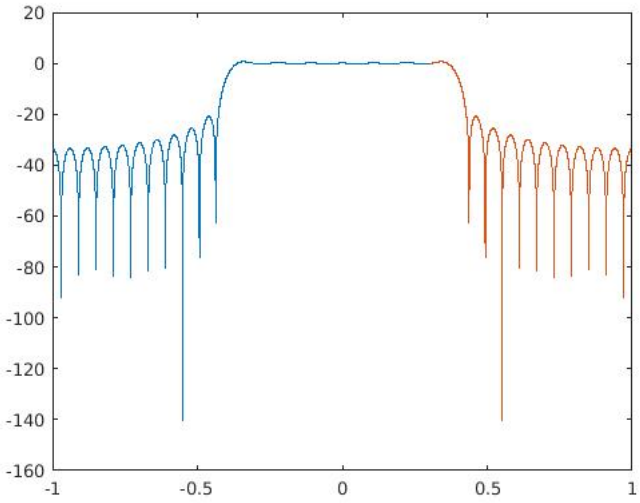
Figur 2: oppg1

2.2 Kaiser



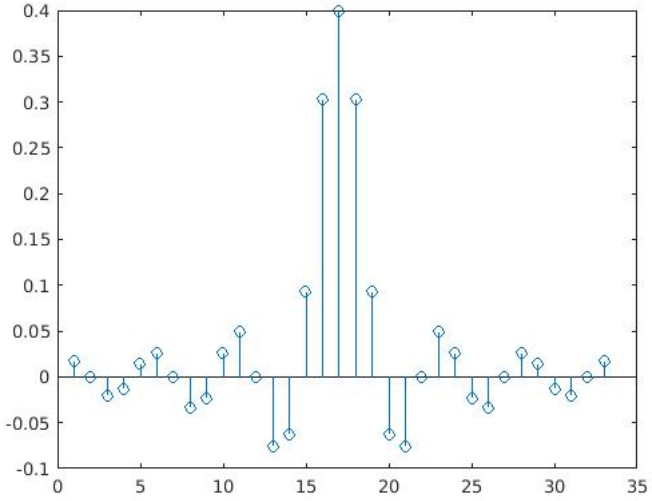
Figur 3: oppg1

3 Oppgave 2



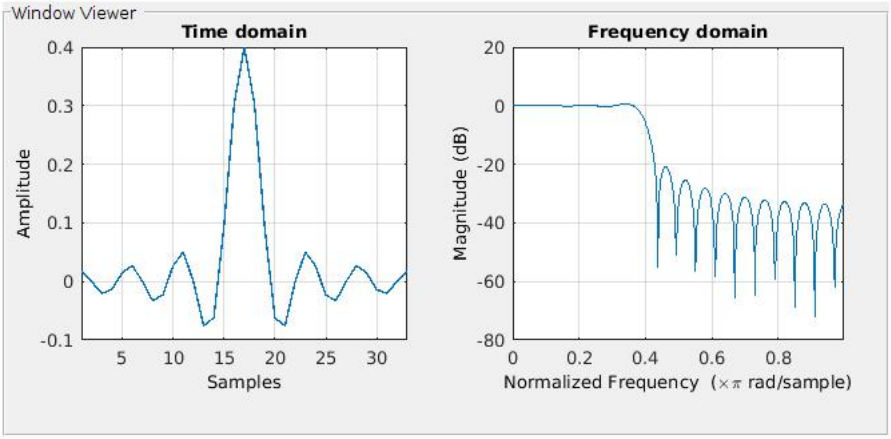
Figur 4: oppg1

4 Oppgave 3

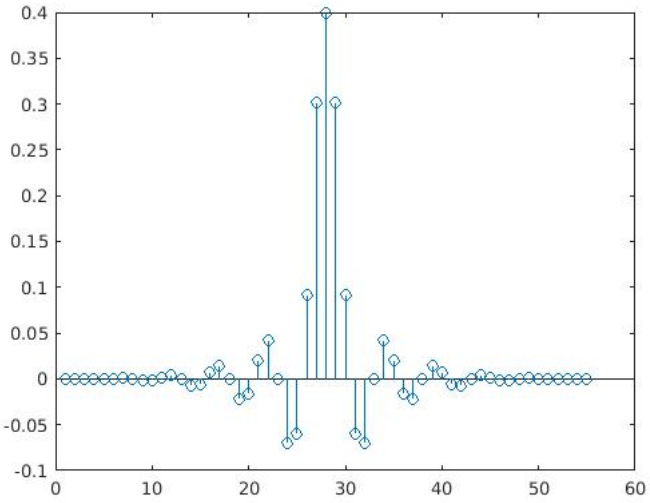


Figur 5: oppg1

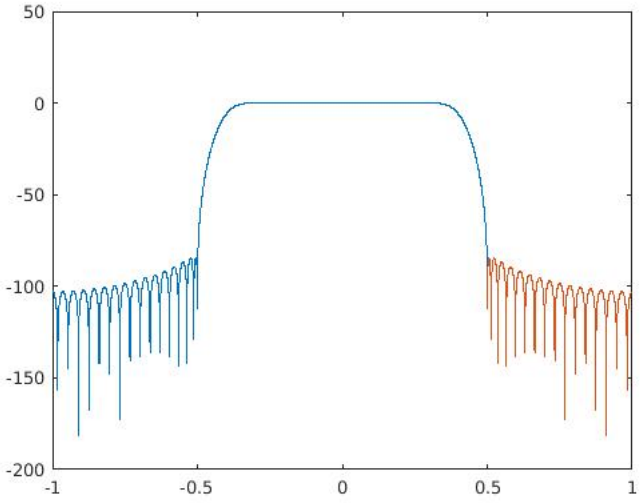
5 Oppgave 4



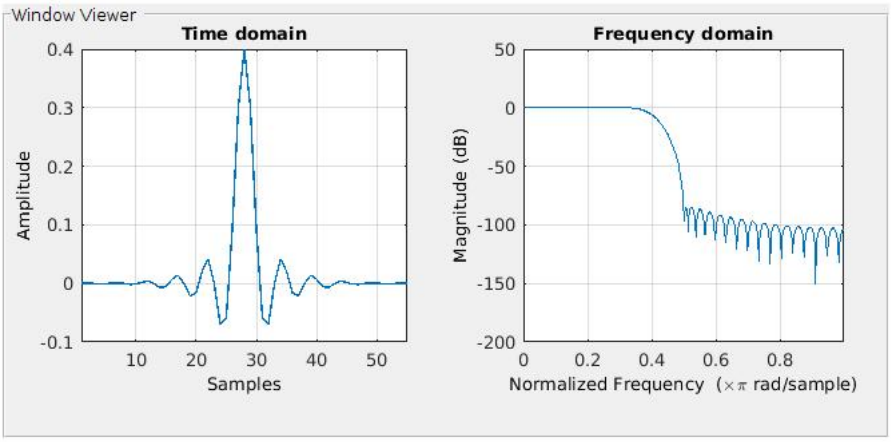
Figur 6: oppg1



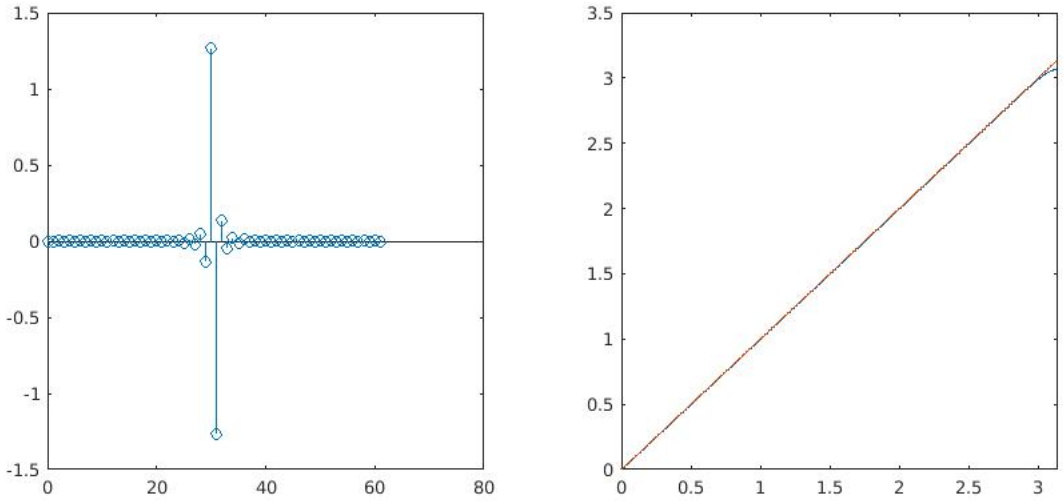
Figur 7: oppg2



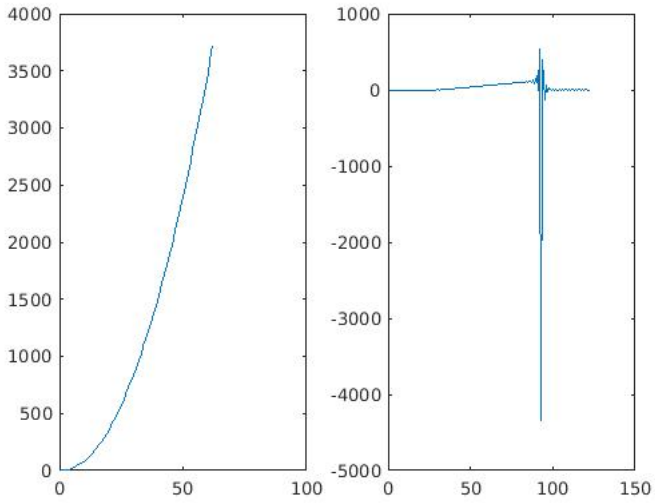
Figur 8: oppg2



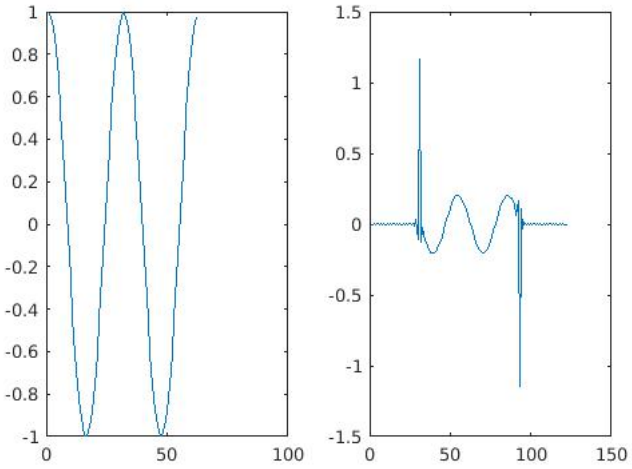
Figur 9: oppg2



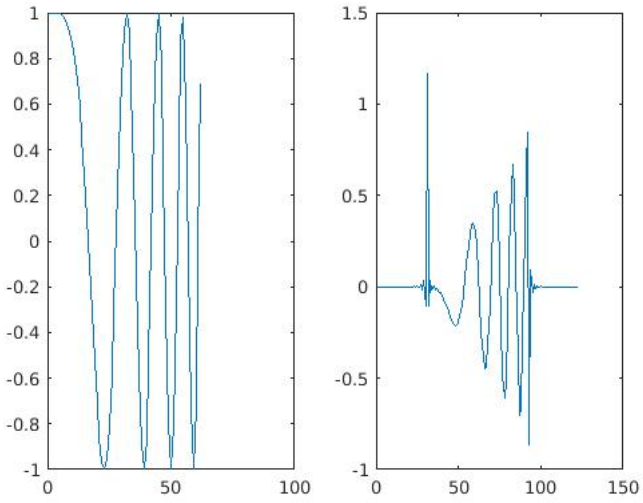
Figur 10: oppg3



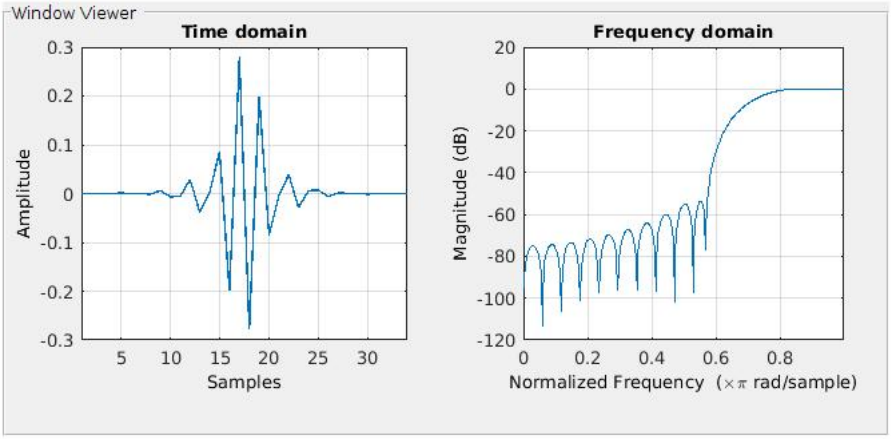
Figur 11: oppg3



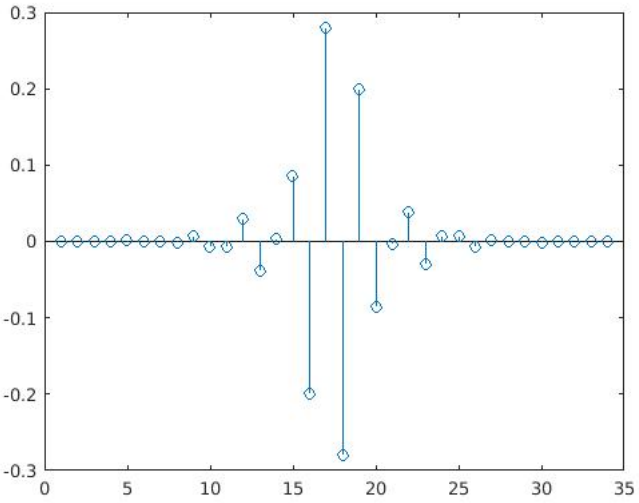
Figur 12: oppg3



Figur 13: oppg3



Figur 14: oppg4



Figur 15: oppg4