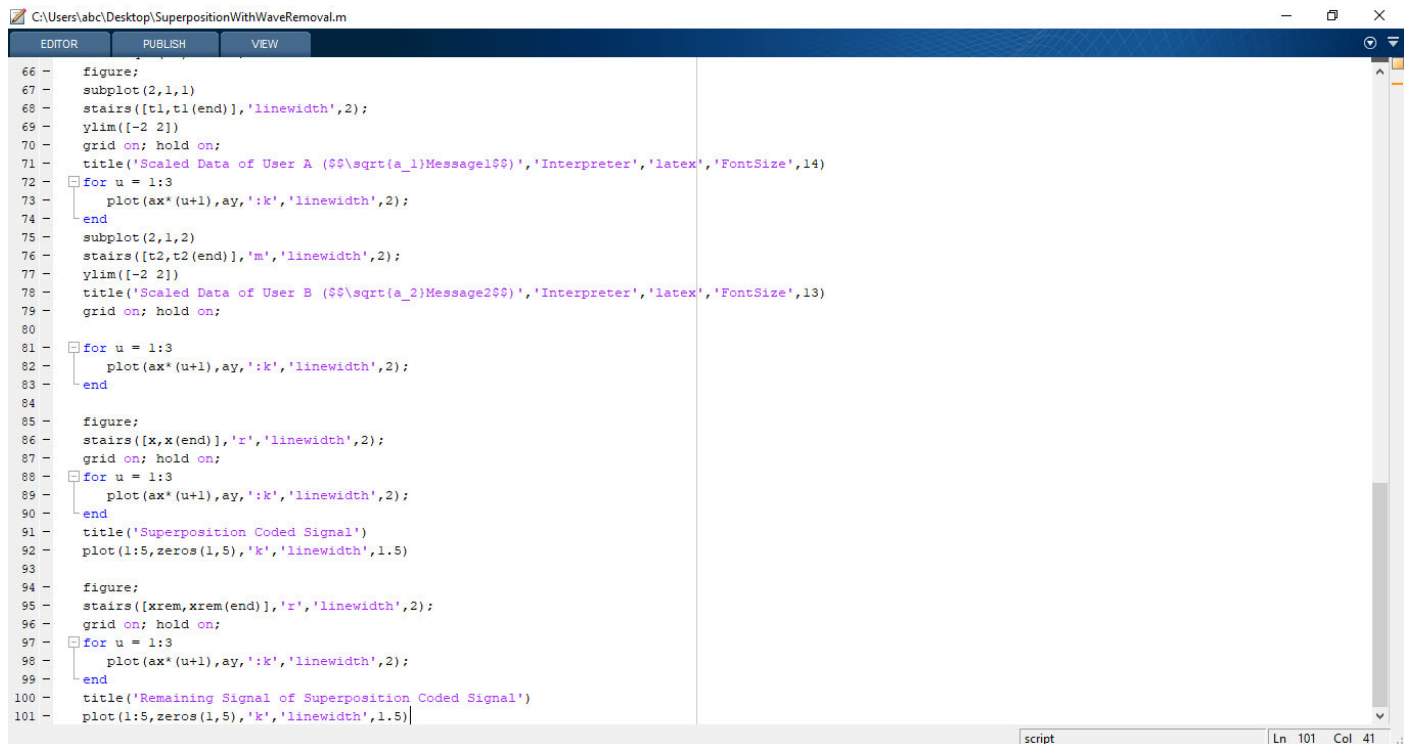


Assignment Number 4

Superposition Coded Signal with Remaining Signal



```
66 - figure;
67 - subplot(2,1,1)
68 - stairs([t1,t1(end)], 'linewidth',2);
69 - ylim([-2 2])
70 - grid on; hold on;
71 - title('Scaled Data of User A ($$\sqrt{a_1}$Message1$$','Interpreter','latex','FontSize',14)
72 - for u = 1:3
73 - plot(ax*(u+1),ay,':k','linewidth',2);
74 - end
75 - subplot(2,1,2)
76 - stairs([t2,t2(end)], 'm', 'linewidth',2);
77 - ylim([-2 2])
78 - title('Scaled Data of User B ($$\sqrt{a_2}$Message2$$','Interpreter','latex','FontSize',13)
79 - grid on; hold on;
80
81 - for u = 1:3
82 - plot(ax*(u+1),ay,':k','linewidth',2);
83 - end
84
85 - figure;
86 - stairs([x,x(end)], 'r', 'linewidth',2);
87 - grid on; hold on;
88 - for u = 1:3
89 - plot(ax*(u+1),ay,':k','linewidth',2);
90 - end
91 - title('Superposition Coded Signal')
92 - plot(1:5,zeros(1,5), 'k', 'linewidth',1.5)
93
94 - figure;
95 - stairs([xrem,xrem(end)], 'r', 'linewidth',2);
96 - grid on; hold on;
97 - for u = 1:3
98 - plot(ax*(u+1),ay,':k','linewidth',2);
99 - end
100 - title('Remaining Signal of Superposition Coded Signal')
101 - plot(1:5,zeros(1,5), 'k', 'linewidth',1.5)
```

Open Matlab and Create a new .m file

Type the following Code

```
clc;
clear all;
close all;

Message1 = [1 1 0 0];
Message2 = [1 0 0 1];

xmod1 = 2*Message1-1;
xmod2 = 2*Message2-1;

a1 = 0.80; a2 = 0.20;
x = sqrt(a1)*xmod1 + sqrt(a2)*xmod2;

xdec1 = ones(1,length(Message1));
xdec1(x<0)=-1;

xrem = x - sqrt(a1)*xdec1;
xdec2 = zeros(1,length(Message1));
xdec1(x<0)=0;
xdec2(xrem>0)=1;

%Plot figures

ay = -2:0.2:2;
ax = ones(1,length(ay));

figure;
subplot(2,1,1)
stairs([Message1,Message1(end)], 'linewidth',2);
```

```

ylim([-2 2])
grid on; hold on;
title('Given Data of User A (Message1)')
for u = 1:3
    plot(ax*(u+1),ay,':k','linewidth',2);
end
subplot(2,1,2)
stairs([Message2,Message2(end)],'m','linewidth',2);
ylim([-2 2])
grid on; hold on;
for u = 1:3
    plot(ax*(u+1),ay,':k','linewidth',2);
end
title('Given Data of User B (Message2)')

figure;
subplot(2,1,1)
stairs([xmod1,xmod1(end)],'linewidth',2);
ylim([-2 2])
grid on; hold on;
title('Modified Data of User A (Message1)')
for u = 1:3
    plot(ax*(u+1),ay,':k','linewidth',2);
end
subplot(2,1,2)
stairs([xmod2,xmod2(end)],'m','linewidth',2);
ylim([-2 2])
grid on; hold on;
for u = 1:3
    plot(ax*(u+1),ay,':k','linewidth',2);
end
title('Modified Data of User B (Message2)');

t1 = sqrt(a1)*xmod1;
t2 = sqrt(a2)*xmod2;
figure;
subplot(2,1,1)
stairs([t1,t1(end)],'linewidth',2);
ylim([-2 2])
grid on; hold on;
title('Scaled Data of User A
($$\sqrt{a_1}Message1$$'),'Interpreter','latex','FontSize',14)
for u = 1:3
    plot(ax*(u+1),ay,':k','linewidth',2);
end
subplot(2,1,2)
stairs([t2,t2(end)],'m','linewidth',2);
ylim([-2 2])
title('Scaled Data of User B
($$\sqrt{a_2}Message2$$'),'Interpreter','latex','FontSize',13)
grid on; hold on;

for u = 1:3
    plot(ax*(u+1),ay,':k','linewidth',2);
end

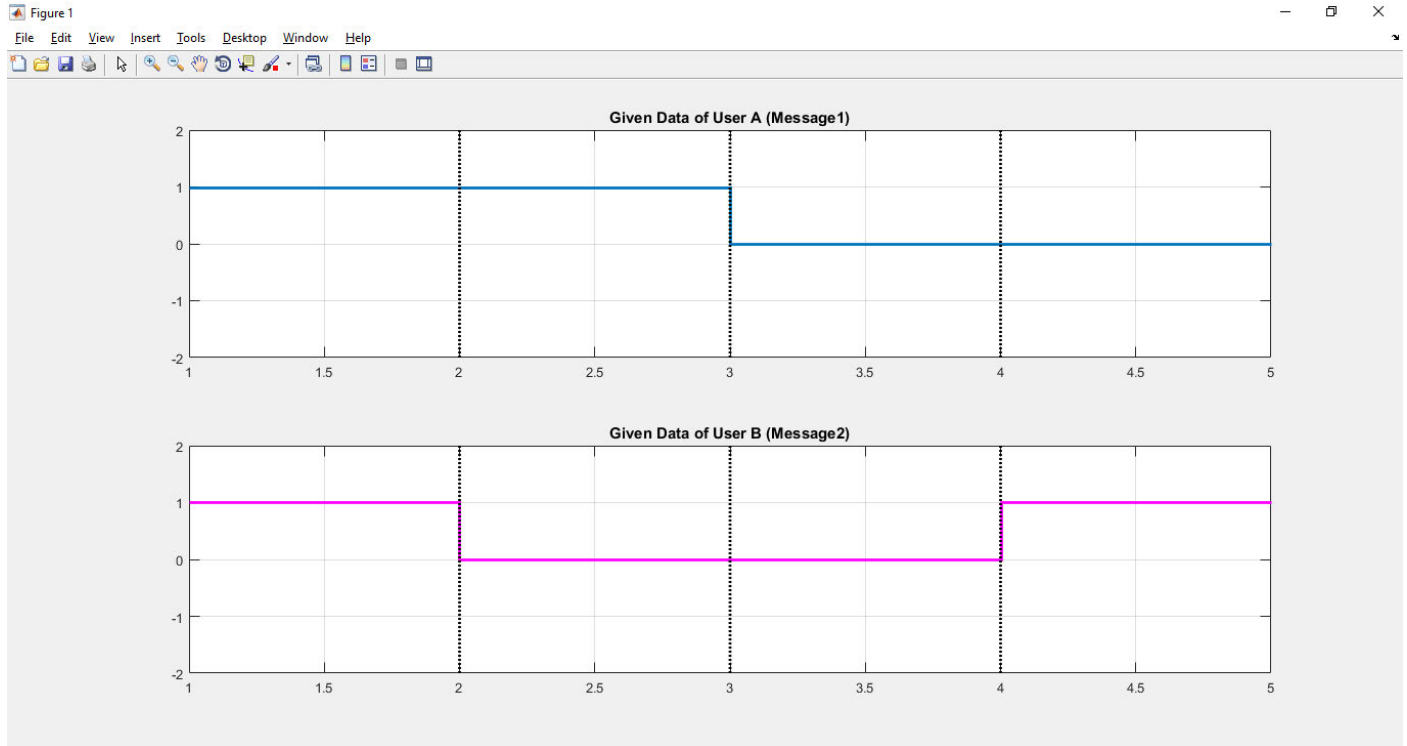
figure;
stairs([x,x(end)],'r','linewidth',2);
grid on; hold on;
for u = 1:3
    plot(ax*(u+1),ay,':k','linewidth',2);
end
title('Superposition Coded Signal')
plot(1:5,zeros(1,5),'k','linewidth',1.5)

```

```
figure;
stairs([xrem,xrem(end)], 'r', 'linewidth', 2);
grid on; hold on;
for u = 1:3
    plot(ax*(u+1), ay, ':k', 'linewidth', 2);
end
title('Remaining Signal of Superposition Coded Signal')
plot(1:5, zeros(1,5), 'k', 'linewidth', 1.5)
```

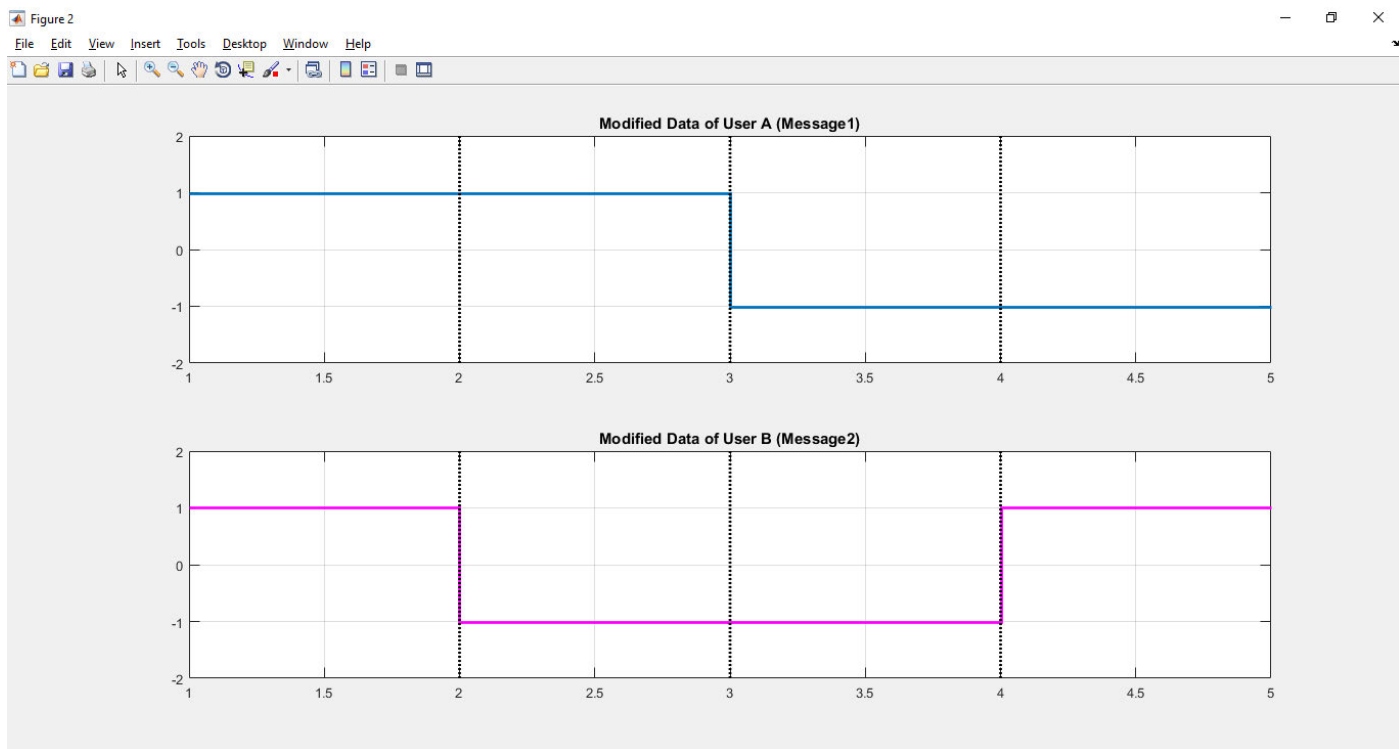
Click on Run

5 New Windows will Open

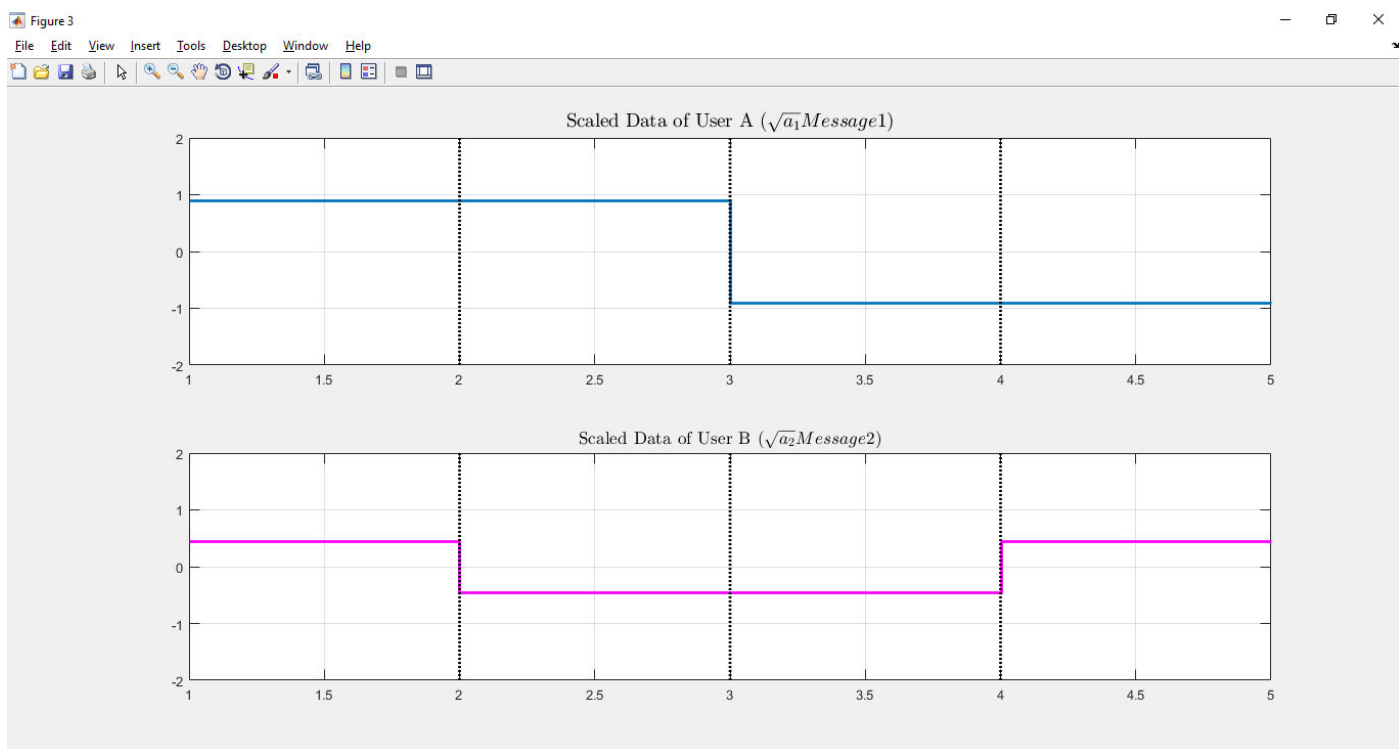


Data being Sent by A = 1100

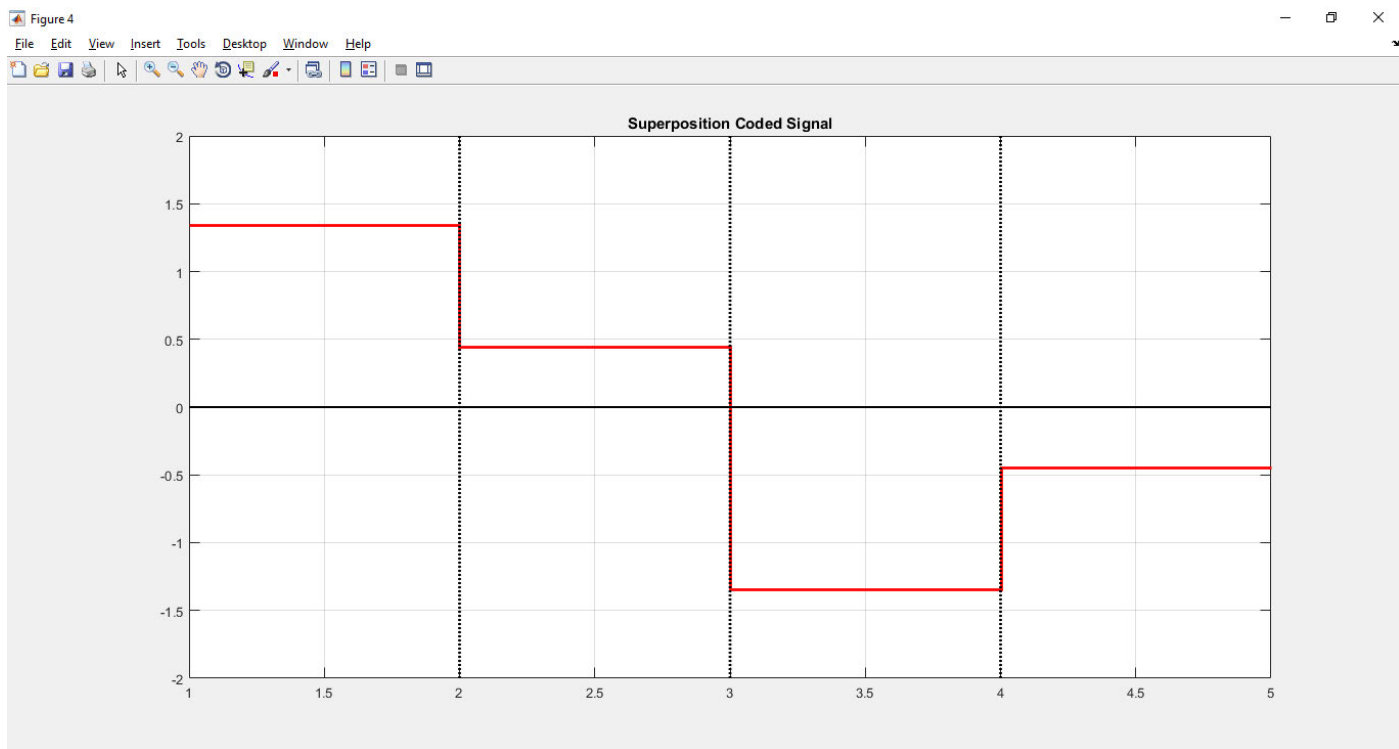
Data being Sent by B = 1001



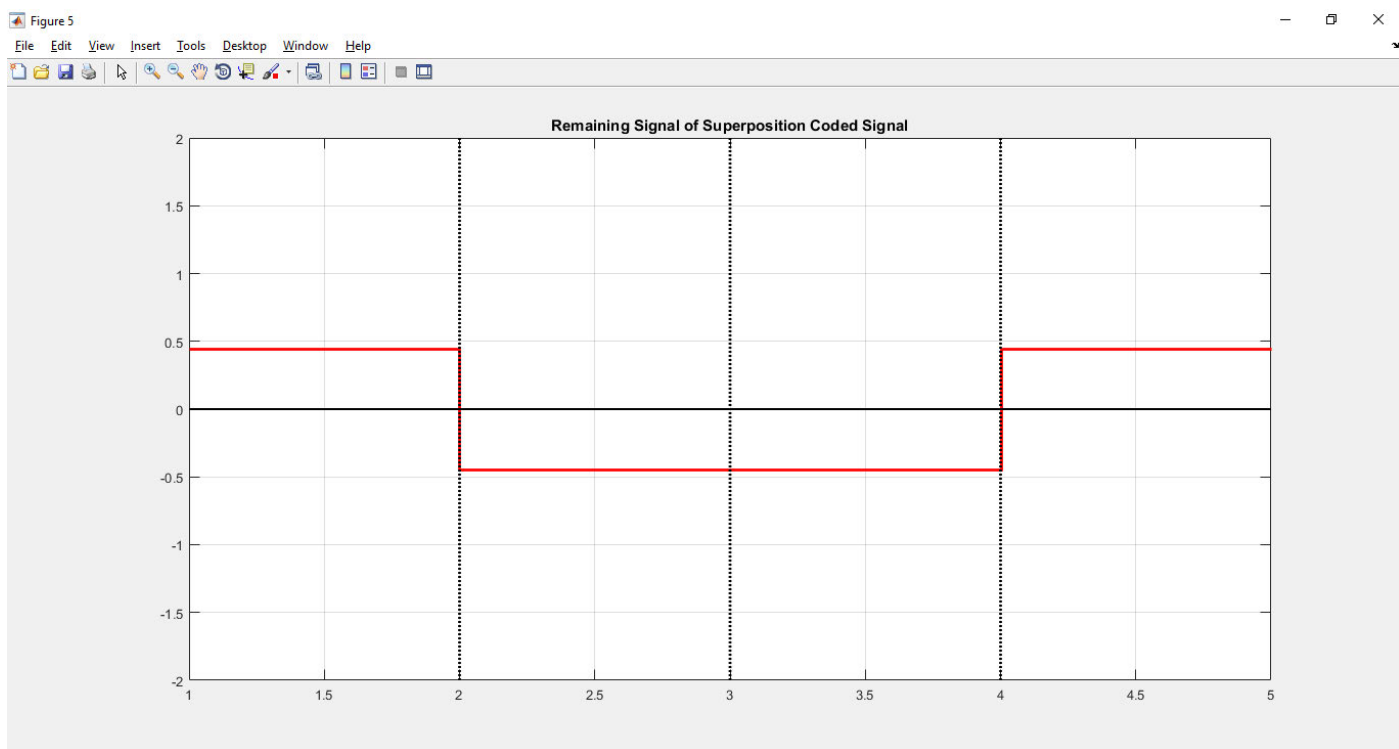
Data after Modification



After Scaling such that it is more than 0 or less than 0



Signal after Super positioning



Signal after Removing the Signal from Far User