T.C YEDİTEPE UNIVERSITY

EE 361 – Introduction to Digital Signal Processing

Experiment 3: Sampling and Aliasing

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```
1
2
3   group_number = 26;
4   A = 2;
5   f = 14;
6   phi = -0.46;
7   fs2 = 17;
8
9   %1
10  t = linspace(0, 1, 1000);
11  s = A*cos(2*pi*f*t + phi);
12
13  %2
14  N = length(s);
15  S = fft(s)/N;
16  frequencies = linspace(0, fs2/2, N/2+1);
17
18  [~, idx] = sort(abs(S(1:N/2+1)), 'descend');
19  sc_cont1 = [frequencies(idx(1)), S(idx(1))];
20  sc_cont2 = [frequencies(idx(2)), S(idx(2))];
21
22  %3
23  idcon(s, t, 6*f); % changed from idcon(sa, Ts1, f);
24
25  %4
26  idcon(s, t, fs2); % changed from idcon(sb, Ts2, f);
27
28  %5
29  N2 = length(s);
30  Ts2 = 1/fs2;
31  n2 = 0:floor(length(s)/Ts2)-1;
32  sb = A*cos(2*pi*f*n2*Ts2 + phi);
33  s2 = idcon(sb, n2*Ts2, fs2);
34
```

```
25  %4
26  idcon(s, t, fs2); % changed from idcon(sb, Ts2, f);
27
28  %5
29  N2 = length(s);
30  Ts2 = 1/fs2;
31  n2 = 0:floor(length(s)/Ts2)-1;
32  sb = A*cos(2*pi*f*n2*Ts2 + phi);
33  s2 = idcon(sb, n2*Ts2, fs2);
34
35  %6
36  N2 = length(s2);
37  S2 = fftshift(fft(s2))/N2;
38  frequencies2 = linspace(-fs2/2, fs2/2, N2);
39
40  [~, idx] = sort(abs(S2), 'descend');
41  sc_disc1 = [2*pi*frequencies2(idx(ceil(N2/2)+1)), S2(idx(ceil(N2/2)+1))];
42  sc_disc2 = [2*pi*frequencies2(idx(ceil(N2/2)+2)), S2(idx(ceil(N2/2)+2))];
43
44  %7
45  spec(frequencies2, abs(S2), 'd'); % changed from spec(frequencies2, S2);
46
47  hold on;
48  plot(sc_disc1(1), abs(sc_disc1(2)), 'ro', 'MarkerSize', 10, 'LineWidth', 2);
49  plot(sc_disc2(1), abs(sc_disc2(2)), 'ro', 'MarkerSize', 10, 'LineWidth', 2);
50  hold off;
51
52  % Save variables to workspace
53  save(['exp3_group',num2str(group_number),'.mat'],...
54      'sc_cont1','sc_cont2','fs1','sc_disc1','sc_disc2');
55
56
```

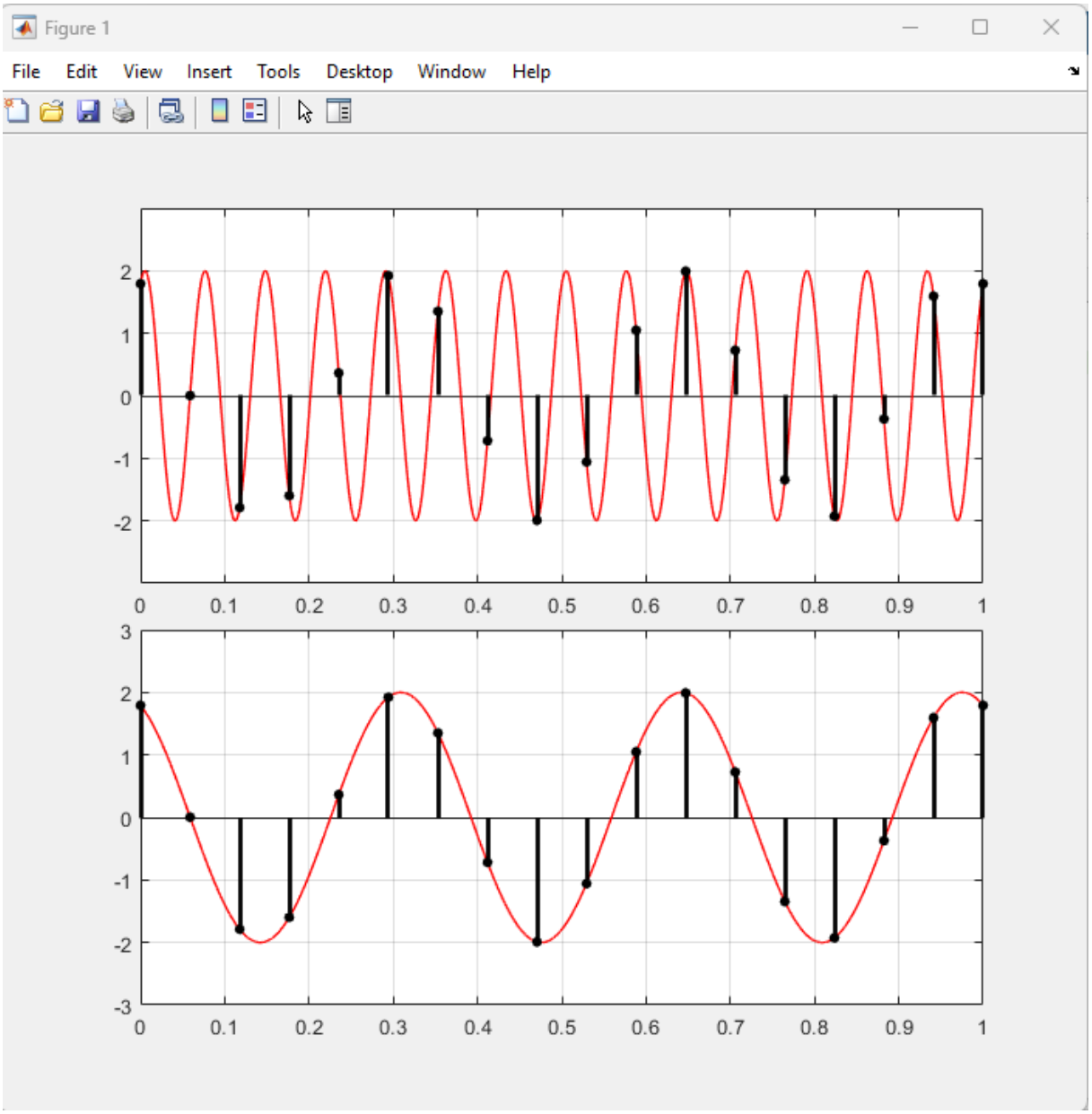
Figure 1
File Edit View Insert Tools Desktop Window Help
2
1
0
-1
-2
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
3
2
1
0
-1
-2
-3
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1