

Digital Signal Processing Lab Assignment 3

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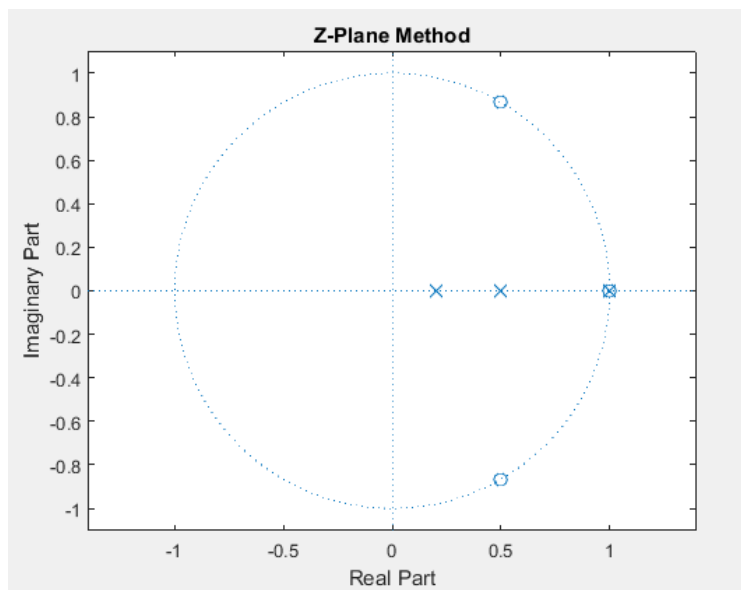
ID: 6071

Group: 3

Question 1-A

Code

```
num1 = [1 -2 2 -1];  
denom1 = [1;0.5;0.2];  
poles2 = poly([1 0.5 0.2]);  
roots(num1);  
msg1 =( ' Roots of Numerator ' );  
disp (msg1)  
disp(roots(num1));  
msg2 =( ' Roots of Denomenator ' );  
disp (msg2)  
disp (denom1);  
figure  
zplane(roots(num1),denom1);  
title ( 'Z-Plane Method');
```



Roots of Numerator

1.0000 + 0.0000i

0.5000 + 0.8660i

0.5000 - 0.8660i

Roots of Denomenator

1.0000

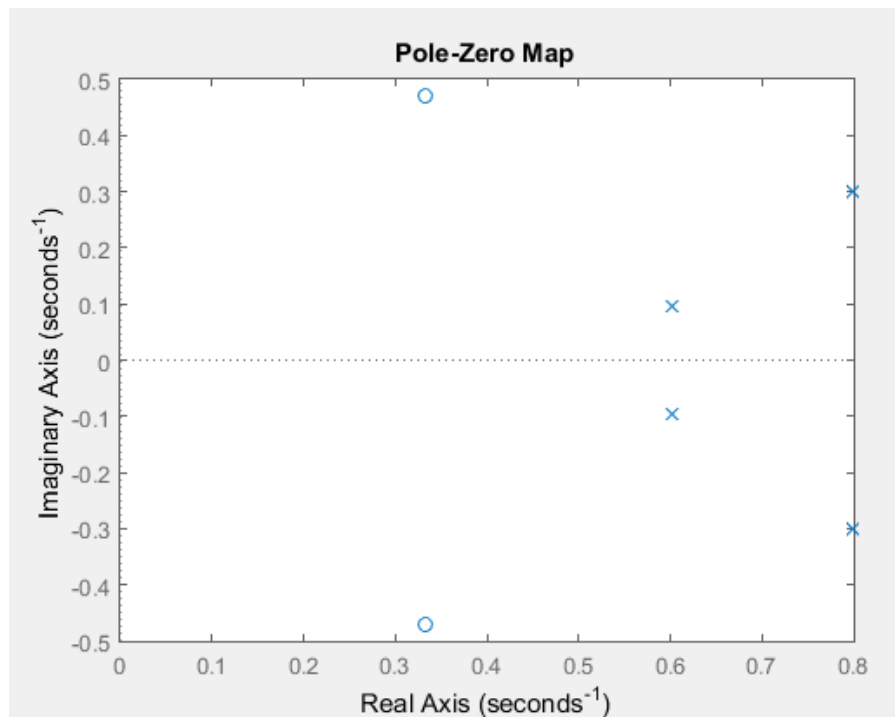
0.5000

0.2000

Question 2

Code

```
y1 = [1 -2.8 3.02 -1.468 0.27];  
x1 = [0.03 -0.02 0.01];  
f = tf(x1,y1);  
figure  
pzmap (f)  
msg1 =( ' Roots of Numerator ' );  
disp (msg1)  
disp (roots(x1))  
msg2 =( ' Roots of Denomenator ' );  
disp (msg2)  
disp (roots(y1))
```



```
Roots of Numerator  
0.3333 + 0.4714i  
0.3333 - 0.4714i  
  
Roots of Denomenator  
0.7988 + 0.3004i  
0.7988 - 0.3004i  
0.6012 + 0.0962i  
0.6012 - 0.0962i
```

The System is stable because the magnitude of all the roots is smaller than (1).

Question 2-i

Code

```
in1 = [5 5*ones(1,40)];  
out1 = filter(x1,y1,in1);  
disp (out1)
```

Columns 1 through 12

0.1500	0.4700	0.9630	1.5972	2.3134	3.0406	3.7121	4.2760	4.7012	4.9784	5.1165	5.1386
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Columns 13 through 24

5.0750	4.9584	4.8190	4.6814	4.5634	4.4751	4.4200	4.3963	4.3986	4.4195	4.4512	4.4866
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Columns 25 through 36

4.5201	4.5478	4.5677	4.5793	4.5833	4.5812	4.5751	4.5667	4.5579	4.5498	4.5433	4.5389
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Columns 37 through 41

4.5365	4.5360	4.5368	4.5386	4.5407
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Question 2-ii

Code

```
Y = [-0.2 0.3 0 0];  
xic = firltic(x1,y1,Y);  
yic = filter(x1,y1,in1,xic);  
disp(yic)
```

Columns 1 through 12

-1.3160	-2.5904	-3.5534	-3.9044	-3.5484	-2.5613	-1.1277	0.5228	2.1675	3.6262	4.7795	5.5723
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Columns 13 through 24

6.0062	6.1264	6.0048	5.7243	5.3654	4.9967	4.6692	4.4146	4.2464	4.1630	4.1524	4.1960
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Columns 25 through 36

4.2736	4.3656	4.4561	4.5338	4.5918	4.6281	4.6436	4.6421	4.6284	4.6076	4.5843	4.5622
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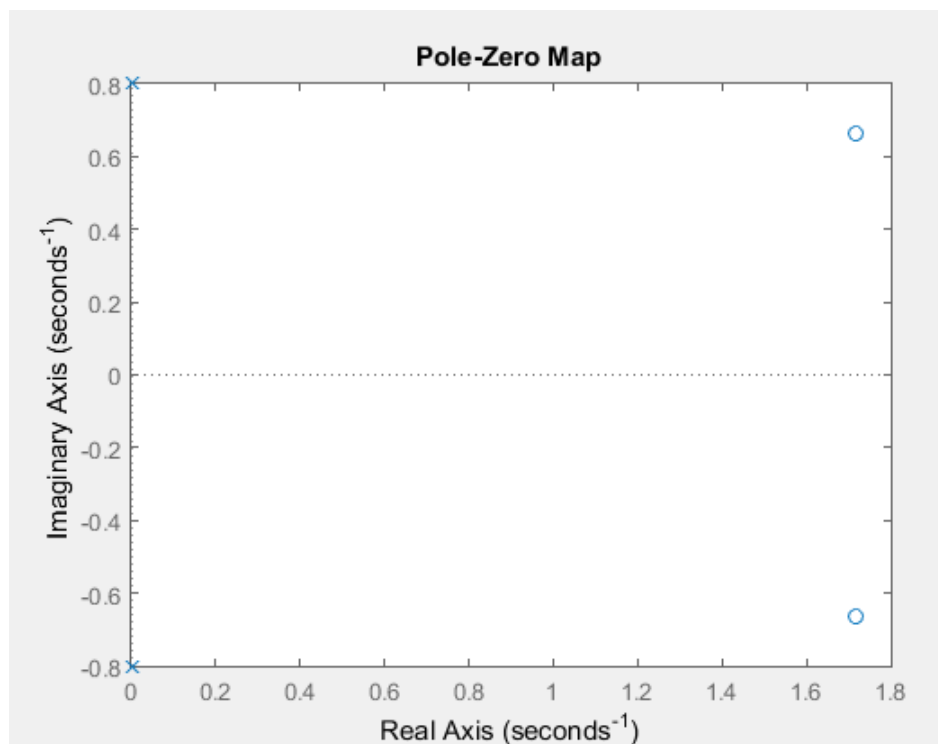
Columns 37 through 41

4.5440	4.5309	4.5232	4.5206	4.5219
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Question 3-A

Code

```
num1 = [0.74 -2.544 2.5126];  
denom1 = [1 0 0.64];  
roots(num1);  
msg1 = ( ' Roots of Numerator ' );  
disp (msg1)  
disp(roots(num1));  
msg2 = ( ' Roots of Denomenator ' );  
disp (msg2)  
disp (denom1);  
f = tf(num1,denom1);  
figure  
pzmap (f)  
delta1 = [1 zeros(1,49)];  
impresponse = filter(num1,denom1,delta1);  
disp(impresponse)
```



Roots of Numerator

1.7189 + 0.6639i

1.7189 - 0.6639i

Roots of Denomenator

1.0000 0 0.6400

Columns 1 through 13

0.7400	-2.5440	2.0390	1.6282	-1.3050	-1.0420	0.8352	0.6669	-0.5345	-0.4268	0.3421	0.2732	-0.2189
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Columns 14 through 26

-0.1748	0.1401	0.1119	-0.0897	-0.0716	0.0574	0.0458	-0.0367	-0.0293	0.0235	0.0188	-0.0150	-0.0120
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Columns 27 through 39

0.0096	0.0077	-0.0062	-0.0049	0.0039	0.0031	-0.0025	-0.0020	0.0016	0.0013	-0.0010	-0.0008	0.0007
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Columns 40 through 50

0.0005	-0.0004	-0.0003	0.0003	0.0002	-0.0002	-0.0001	0.0001	0.0001	-0.0001	-0.0001		
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Question 3-B

Code

```
n = 0:1:49;
in1 = (2*(0.8).^n)-(2*(0.3).^n);
y = filter(num1,denom1,in1);
disp (y)
syms Z n
in1 = ztrans((2*(0.8).^n)-(2*(0.3).^n));
msg3 = (' X(z) ');
disp(msg3);
disp(in1);
out1 = in1*((0.74*(Z^2))-(2.544*Z)+2.5216)/((Z^2)+0.64);
msg4 = (' H(z) ');
disp(msg4);
disp(out1);
out1num = [0.74 2.544 2.5216 0];
out1denom = [1 -1.1 0.88 -0.704 0.1536];
zplane(roots(out1num), roots(out1denom));
```

Input x(n)

Columns 1 through 13

0	0.7400	-1.7300	-0.0416	1.9976	0.9024	-0.5288	0.0369	0.8344	0.3745	-0.2152	0.0155	0.3419
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Columns 14 through 26

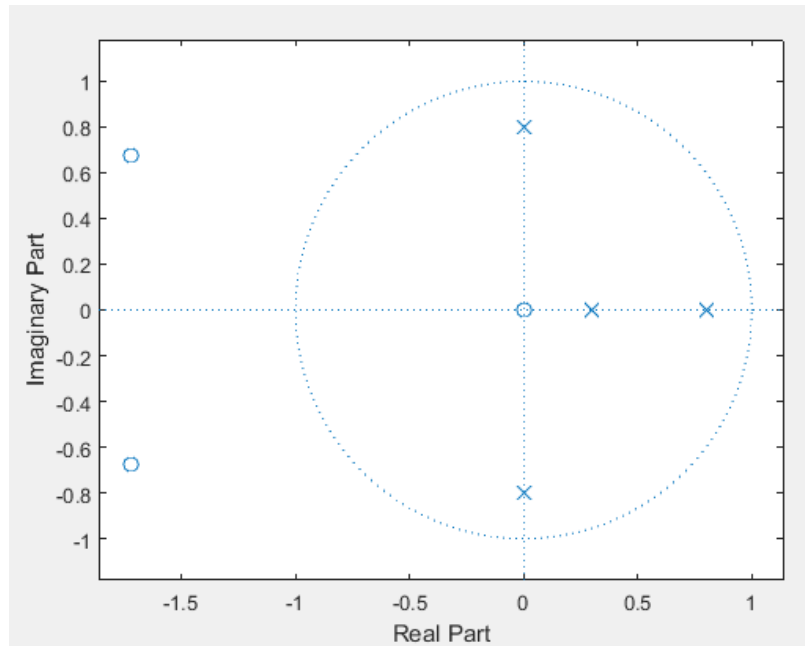
0.1534	-0.0881	0.0064	0.1400	0.0628	-0.0361	0.0026	0.0574	0.0257	-0.0148	0.0011	0.0235	0.0105
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Columns 27 through 39

-0.0061	0.0004	0.0096	0.0043	-0.0025	0.0002	0.0039	0.0018	-0.0010	0.0001	0.0016	0.0007	-0.0004
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Columns 40 through 50

0.0000	0.0007	0.0003	-0.0002	0.0000	0.0003	0.0001	-0.0001	0.0000	0.0001	0.0000		
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Columns 1 through 12

0	0.7400	-1.7300	-0.0416	1.9976	0.9024	-0.5288	0.0369	0.8344	0.3745	-0.2152	0.0155
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Columns 13 through 24

0.3419	0.1534	-0.0881	0.0064	0.1400	0.0628	-0.0361	0.0026	0.0574	0.0257	-0.0148	0.0011
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Columns 25 through 31

0.0235	0.0105	-0.0061	0.0004	0.0096	0.0043	-0.0025
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