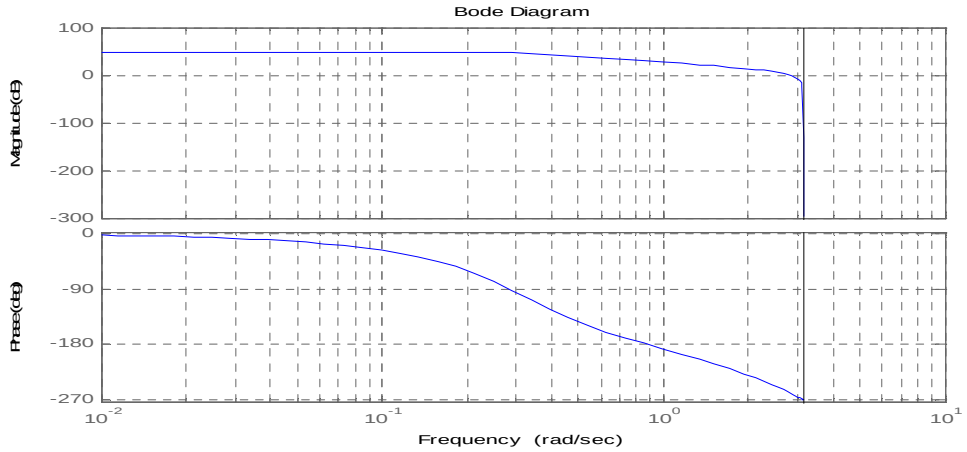
071206/Thomas Munther

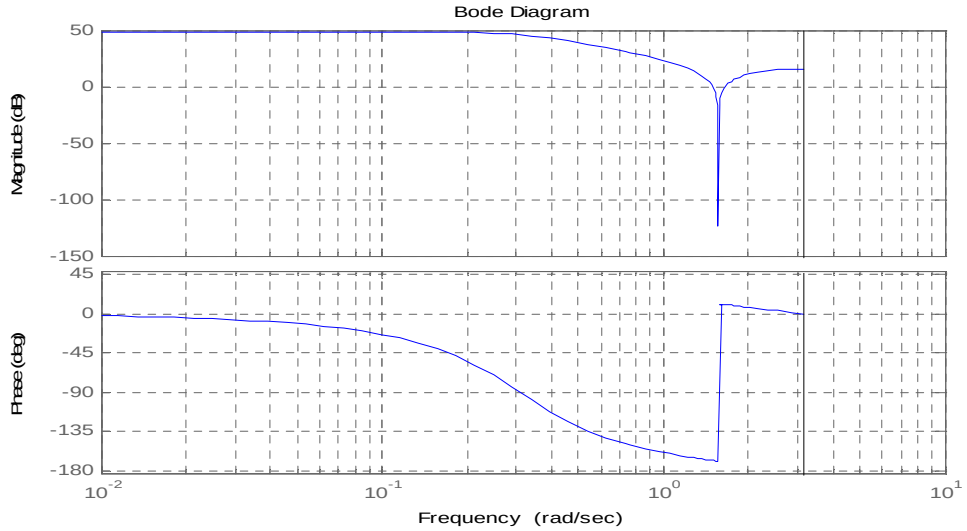
Questions regarding filter characteristics due to poles and zeros

1) Connect the Bode diagrams below with corresponding transfer function. Motivate your answer !

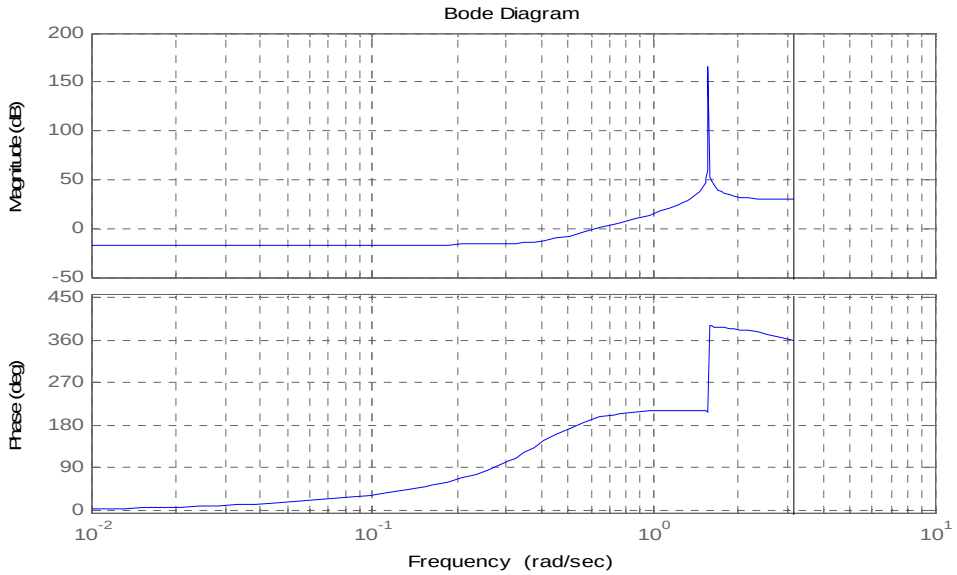
A)



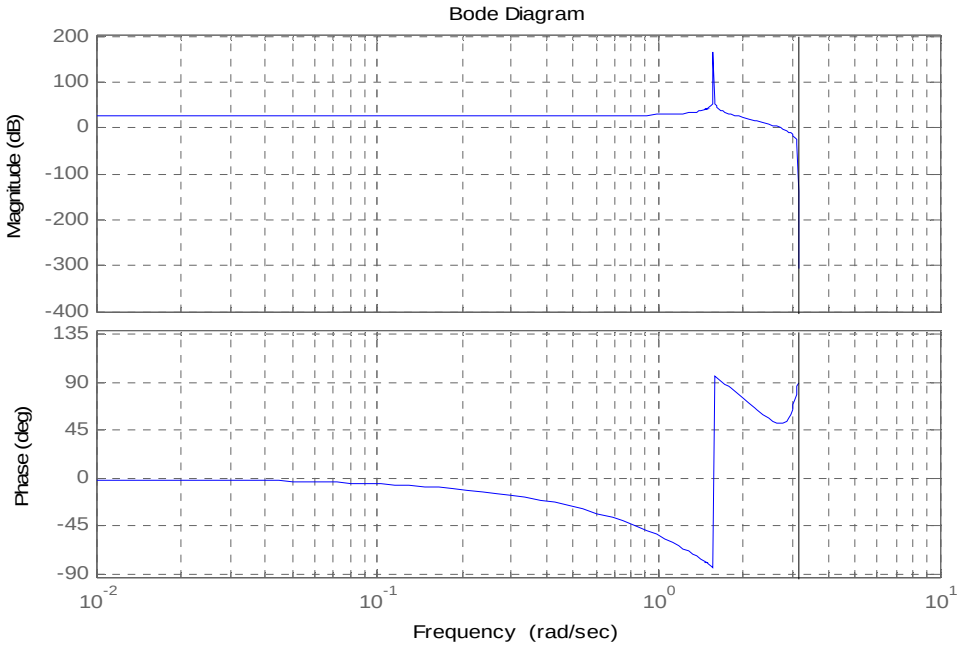
B)



C)


Bode Diagram
Magnitude (dB)
200
150
100
50
0
-50
Phase (deg)
450
360
270
180
90
0
10^-2
10^-1
10^0
10^1
Frequency (rad/sec)

D)


Bode Diagram
Magnitude (dB)
200
100
0
-100
-200
-300
-400
Phase (deg)
135
90
45
0
-45
-90
10^-2
10^-1
10^0
10^1
Frequency (rad/sec)

I) $\dfrac{10\,(z+1)}{(z^2 - 1.6z + 0.68)}$

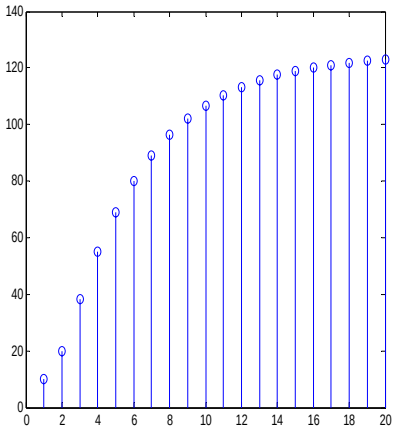
II) $\dfrac{10\,(z-0.8)\,(z^2 - 1.6z + 0.73)}{z\,(z^2 + 1)}$

III) $\dfrac{10\,z^2 + 18\,z + 8}{z^3 + z}$

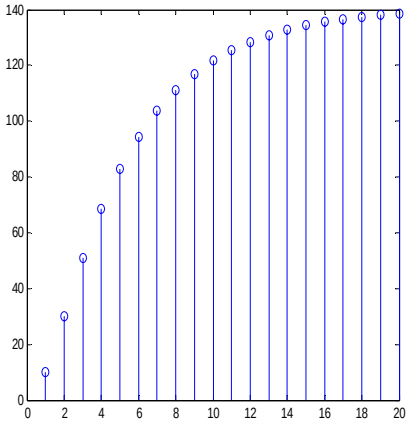
IV) $\dfrac{10\,(z^2 + 1)}{(z^2 - 1.6z + 0.68)}$

2) Connect the step responses with correct pole- zero diagram!
Motivate your answer !

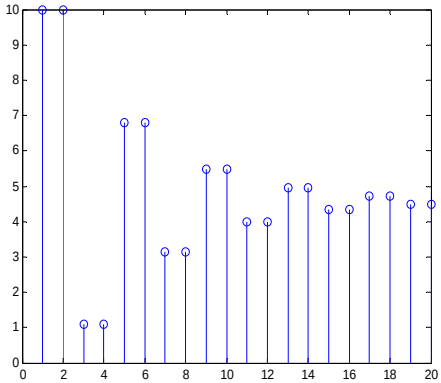
A)



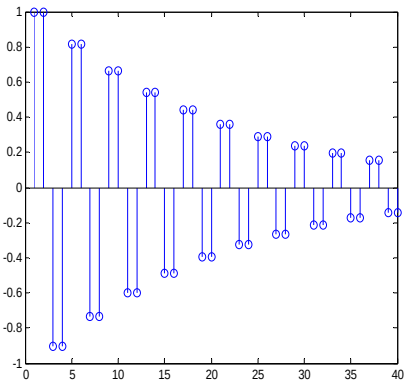
B)



C)



D)



I) $\frac{z^2 - 1}{z^2 + 0.9025}$

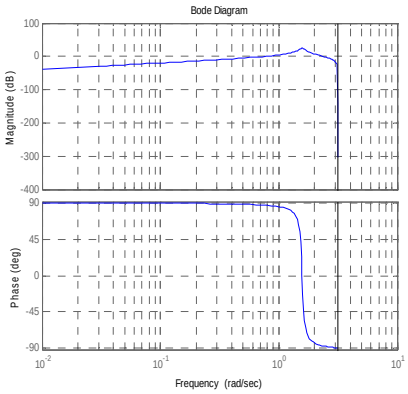
II) $\frac{10 (z+0.2) (z+0.8)}{(z^2 + 1)}$

III) $\frac{10 (z+0.5)^2}{(z-0.2) (z-0.8)}$

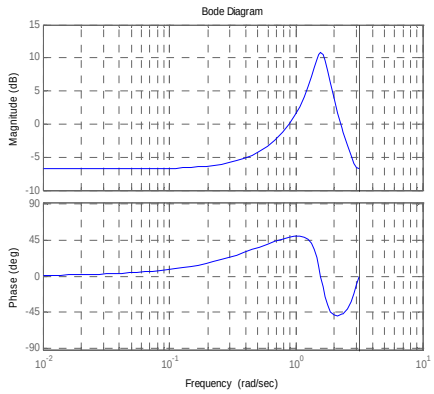
IV) $\frac{z^2 - 0.25}{z^2 + 0.64}$

3) Connect the transfer functions I – IV in problem 2 with the Bode plots below!

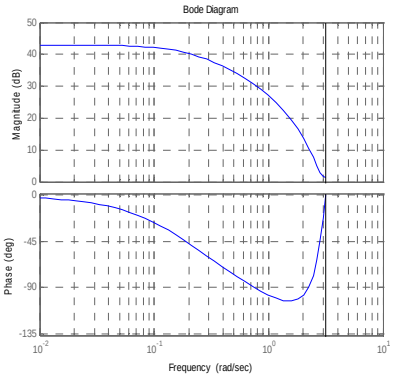
A)



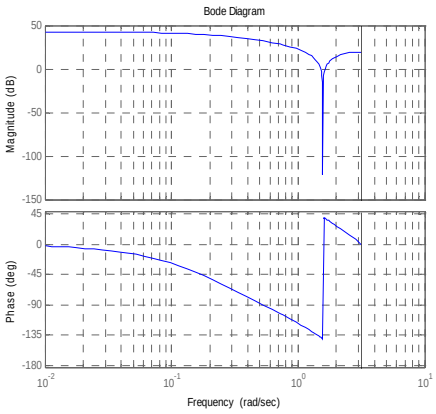
B)



C)



D)



Answers:

1) A and I, B and IV, C and II , D and III

2) A and II, B and III, C and IV, D and I

3) A and I, B and IV, C and III, D and II