**Fractional Zero**

Fractional zero transfer function is given by ) = …... (1)

Put s = jω, in equation (1) results into ) =…… (2)

Magnitude in dB is given by |) | dB = 20log ( )

**Calculation procedure**

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Applying De Moivre’s theorem in above equation we get

= …… (3)

Put equation (3) in (2) we get

) =+a

= +

Magnitude, |) | =

=

Now, Magnitude in dB, |) | dB = 20log

In the sum ), dominates at lower frequencies whereas dominates at higher frequencies.

For approximation we consider = .We obtain corner frequency at =.

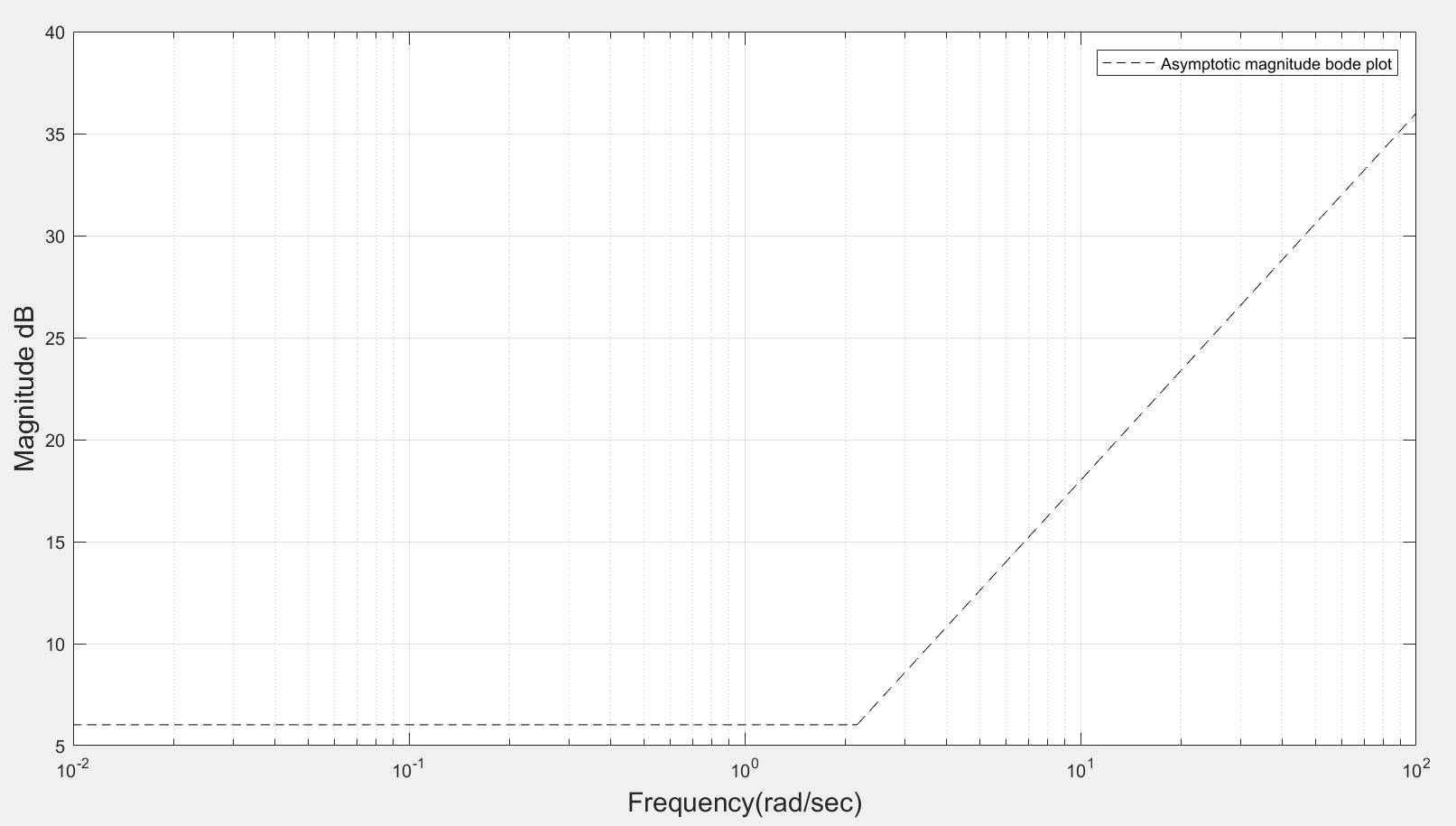
Now, following approximation of magnitude is obtained:

1. For ω ≤ , |) | dB = 20log = 20log|a|.
2. For ω >, |) | dB = 20log= 20αlog ω.

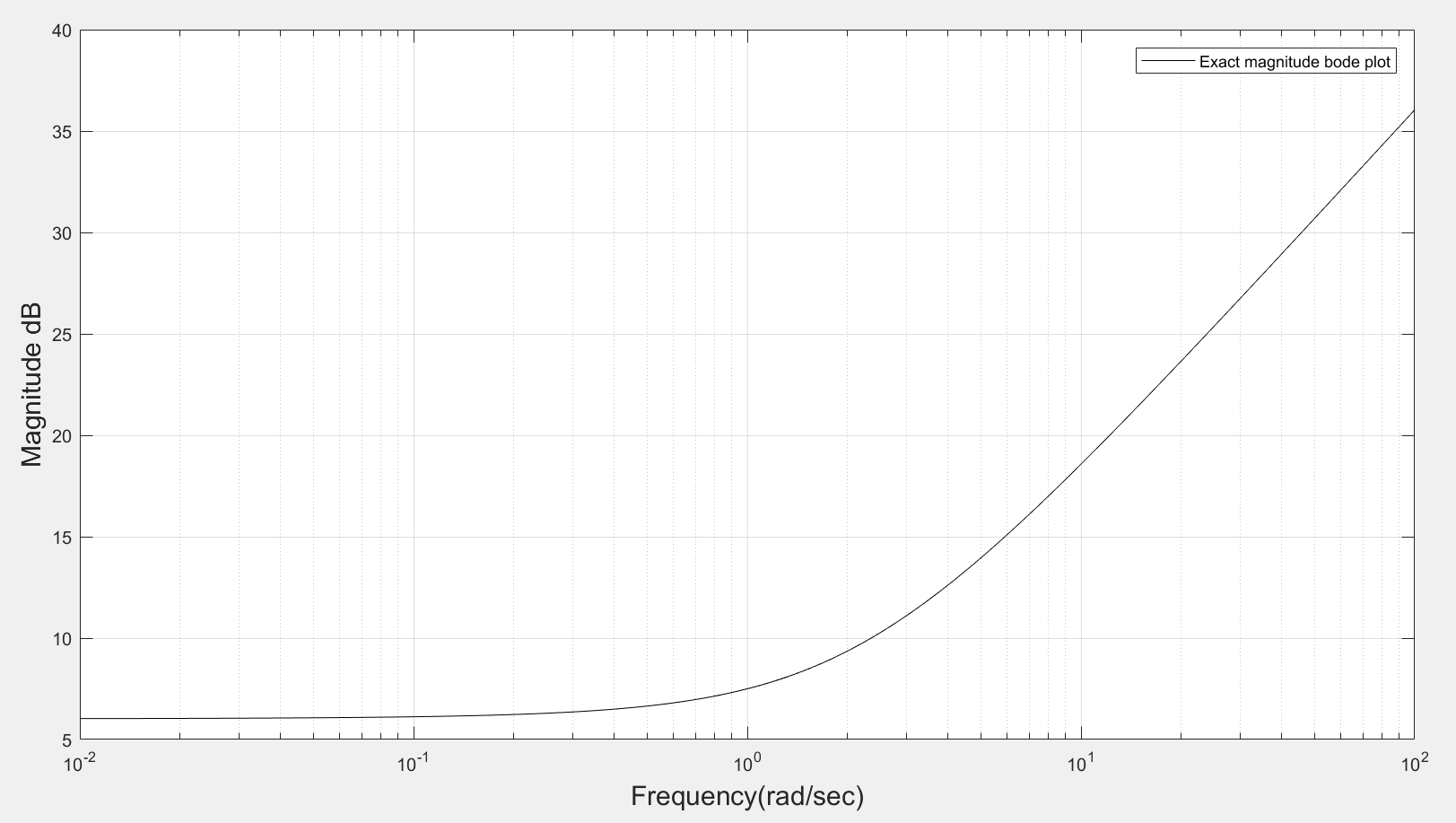
**Procedure**

* Compute the corner frequency = and locate the point at magnitude 20log|a|.
* Draw a slope 0 dB/decade for ω ≤ and a line with slope 20α dB/decade for ω>

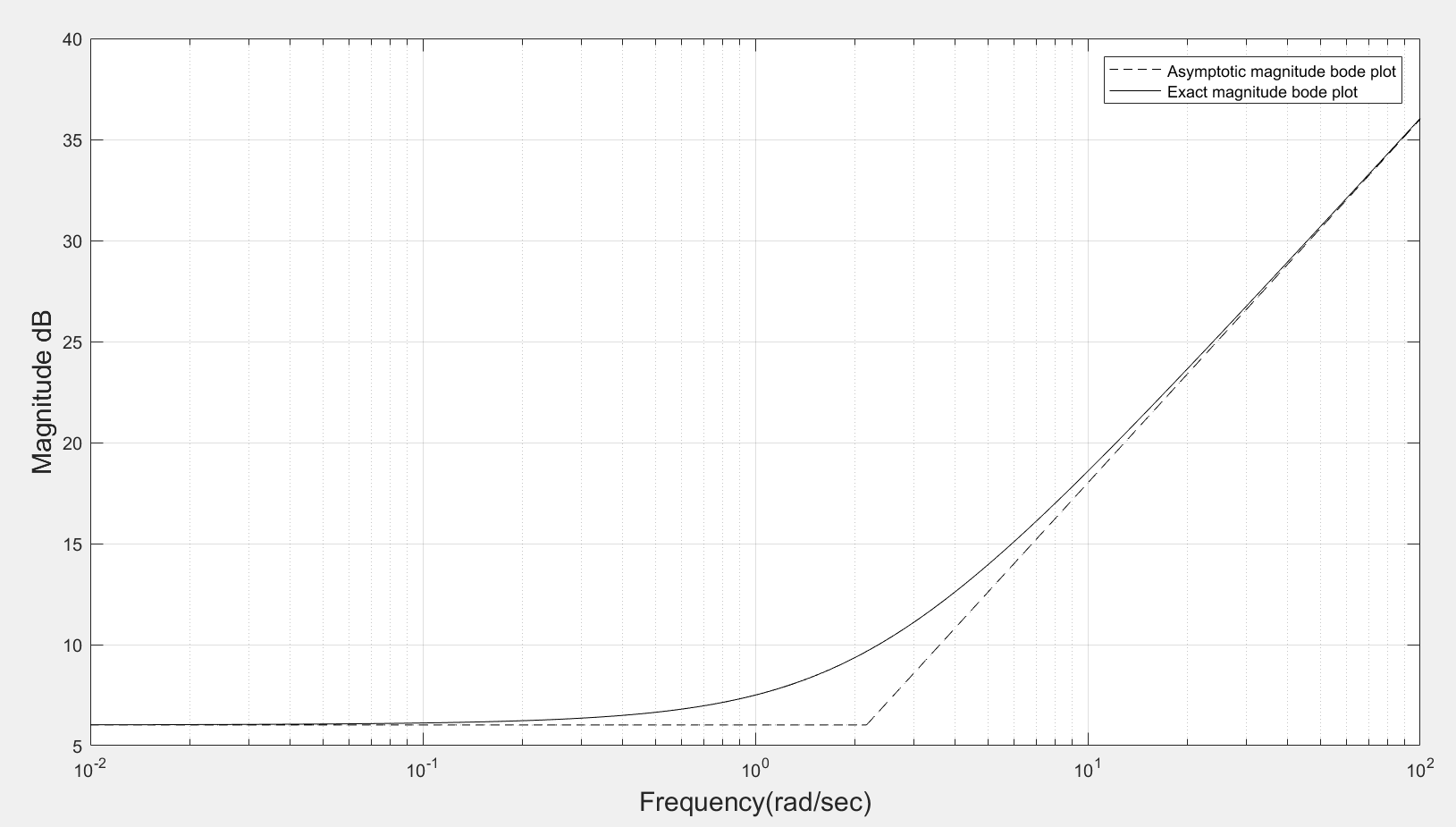
**Results**: Taking α = 0.8, a = 3 and 3.948.

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**Figure 3.2-Asymptotic magnitude bode plot of fractional zero**

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**Figure 3.3-Exact magnitude bode plot for fractional zero.**

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**Figure 3.4-Asymptotic and exact magnitude bode plot for fractional zero**