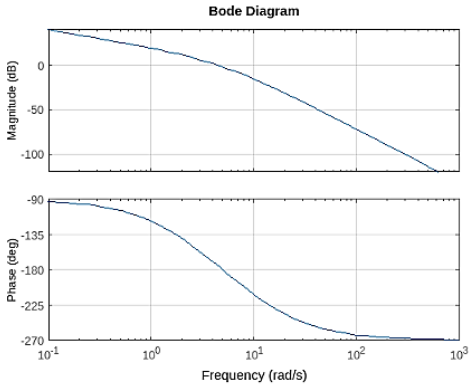
1. **Find out the stability of the system given by Transfer function G(s) = $\frac{10}{s(1+0.1s)(1+0.4s)}$ through the construction of bode plot.**

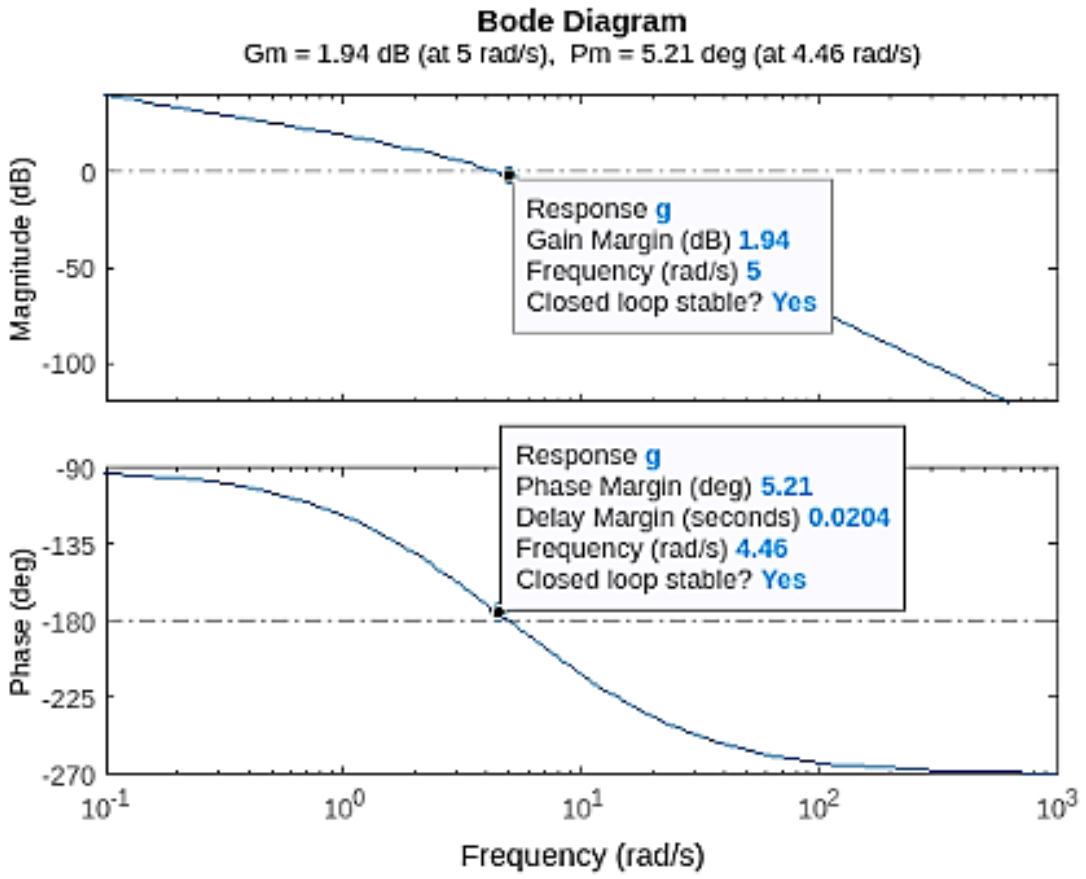
MATLAB Code:



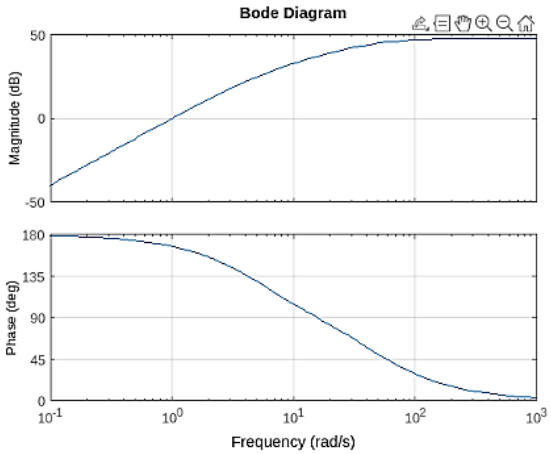

```
num = [10];
den = [0.04 0.5 1 0];
g = tf(num, den);
bode(g)
grid on
[Gm,pm,wcp,wgc]=margin(g);
margin(g)
fprintf('Gain Margin (GM): %.2f dB\n', Gm);
fprintf('Phase Margin (PM): %.2f degrees\n', pm);
fprintf('Gain Crossover Frequency (wcg): %.2f rad/s\n', wcg);
fprintf('Phase Crossover Frequency (wpc): %.2f rad/s\n', wpc);
```

Output:

Gain Margin (GM): 1.25 dB
Phase Margin (PM): 5.21 degrees
Gain Crossover Frequency (wcg): 0.00 rad/s
Phase Crossover Frequency (wpc): 1.01 rad/s



2. **Find out the stability of the system given by Transfer function G(s) = $\frac{s^2}{(1+0.2s)(1+0.02s)}$ through the construction of bode plot.**



MATLAB Code:

```
num = [1 0 0];
den = [0.004 0.22 1];
g = tf(num, den);
bode(g)
grid on
[Gm,pm,wcp,wgc]=margin(g);
margin(g)
fprintf('Gain Margin (GM): %.2f dB\n', Gm);
fprintf('Phase Margin (PM): %.2f degrees\n', pm);
fprintf('Gain Crossover Frequency (wcg): %.2f rad/s\n', wcg);
fprintf('Phase Crossover Frequency (wpc): %.2f rad/s\n', wpc);
```

Output:

Gain Margin (GM): Inf dB
Phase Margin (PM): -12.58 degrees
Gain Crossover Frequency (wcg): 0.00 rad/s
Phase Crossover Frequency (wpc): 1.01 rad/s