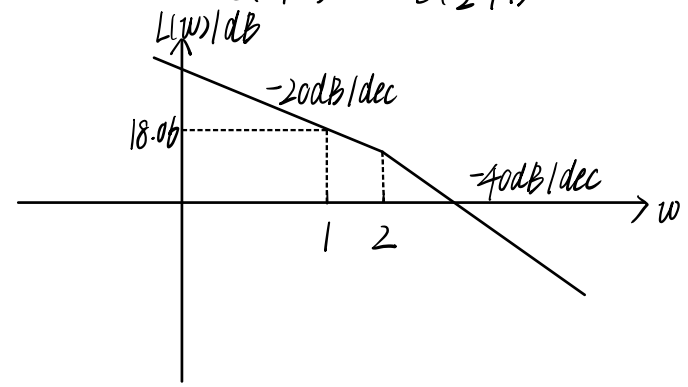
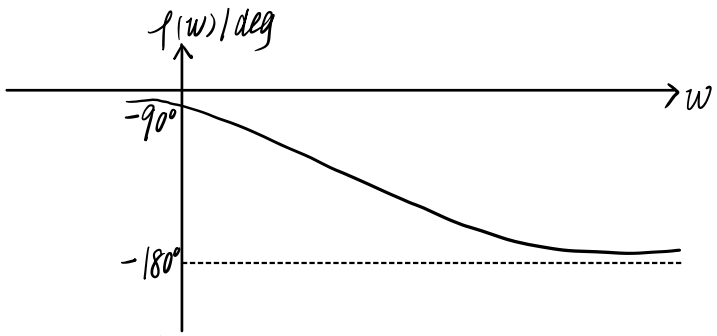
1. $G(s)=\frac{k}{s(s^2+s+100)}$，$G(j\omega)=\frac{k}{j\omega(100-\omega^2+j\omega)}$

$\angle G(j\omega)H(j\omega)=-90°-\arctan\frac{\omega}{100-\omega^2}=-180°$ 时，得 $\omega_g=10\,rad/s$

$|G(j\omega_g)H(j\omega_g)|=\frac{k}{100}=\frac{1}{10}$，得 $k=10$

2、$G(s)H(s)=\frac{16}{s(s+2)}=\frac{8}{s(\frac{s}{2}+1)}$，Bode图如下





$\frac{L(2)-L(1)}{lg2-lg1}=-20$，得 $L(2)=12.04dB$

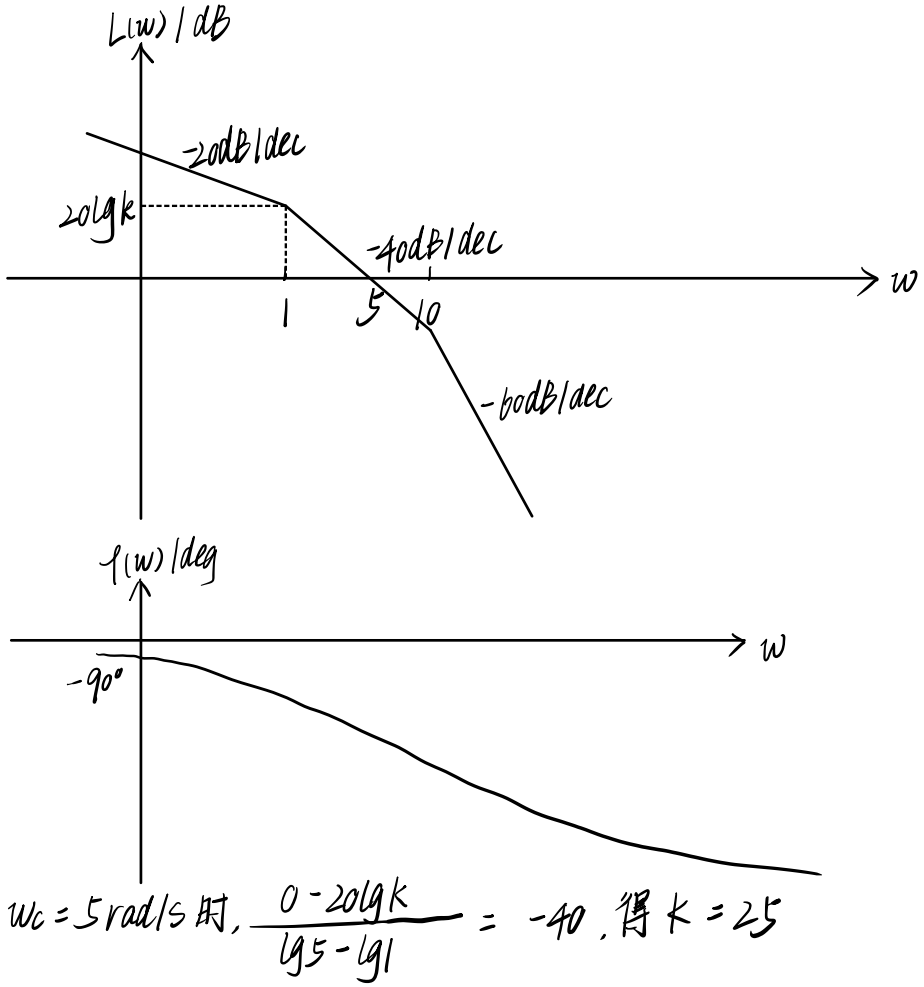
$\frac{0-L(2)}{lg\omega_c-lg2}=-40$，得 $\omega_c=4rad/s$

$\gamma=180°+\varphi(\omega_c)=180°-90°-\arctan\frac{\omega_c}{2}=26.57°$

3、$\gamma = 180° - 3\arctan 0.01\omega_c = 45°$，得 $\omega_c = 100\ rad/s$

$|G(j\omega_c)H(j\omega_c)| = \frac{k}{2\sqrt{2}} = 1$，得 $k = 2\sqrt{2}$

4、Bode 图如下：



$\omega_c = 5\ rad/s$ 时，$\frac{0 - 20\lg k}{\lg 5 - \lg 1} = -40$，得 $k = 25$