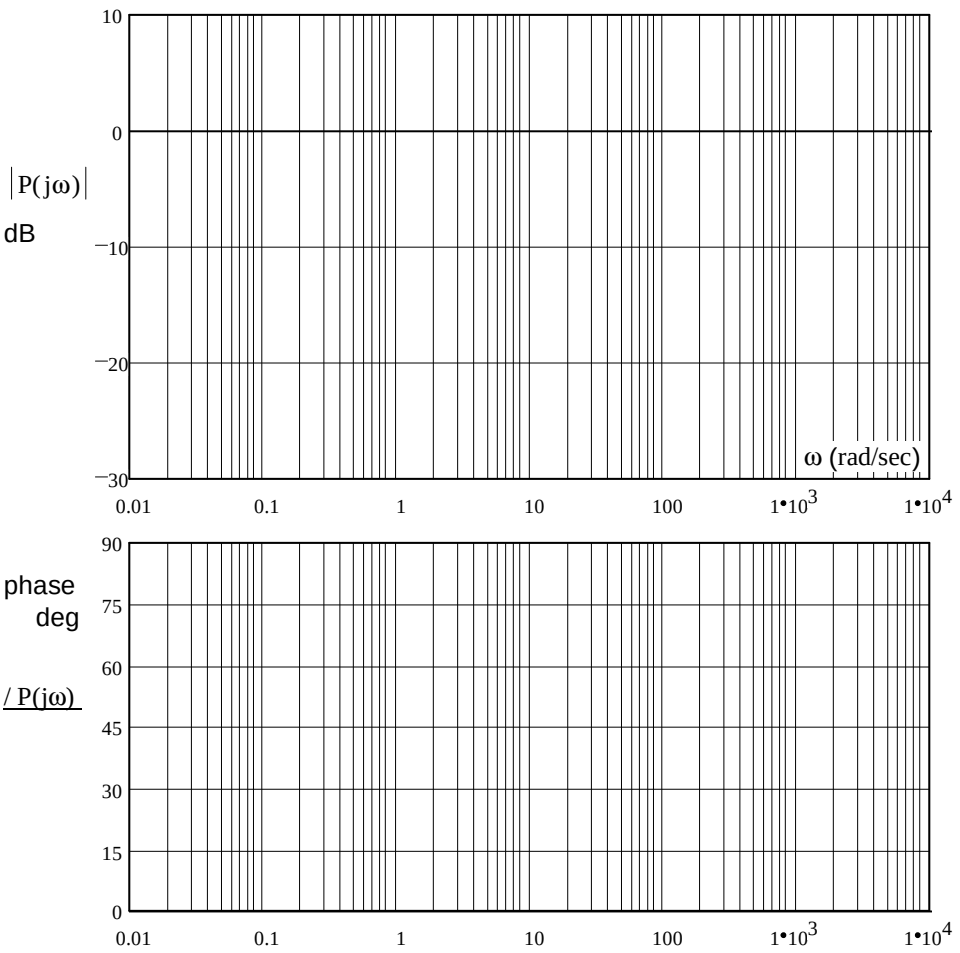
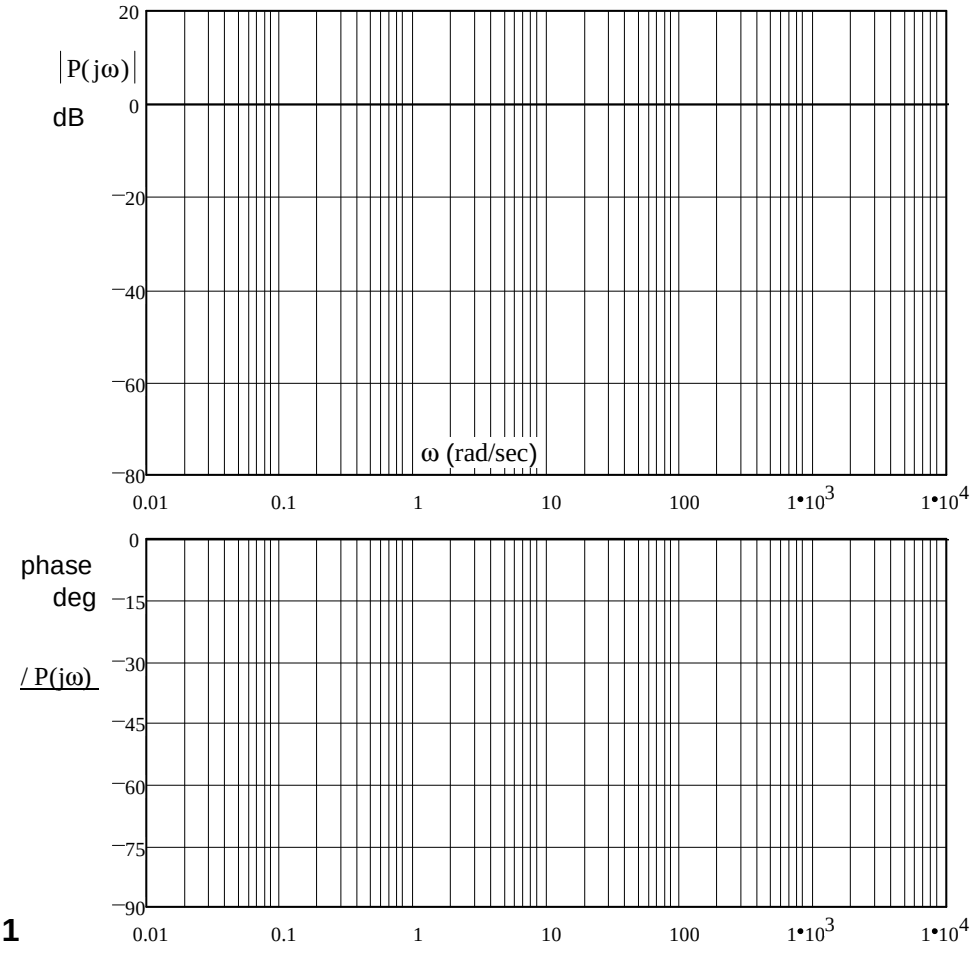
ECE 3510
Bode Plot Examples

A. Stolp
3/27/14

Ex. 1 $P(s) = \dfrac{2\cdot(s+10)}{s+100}$

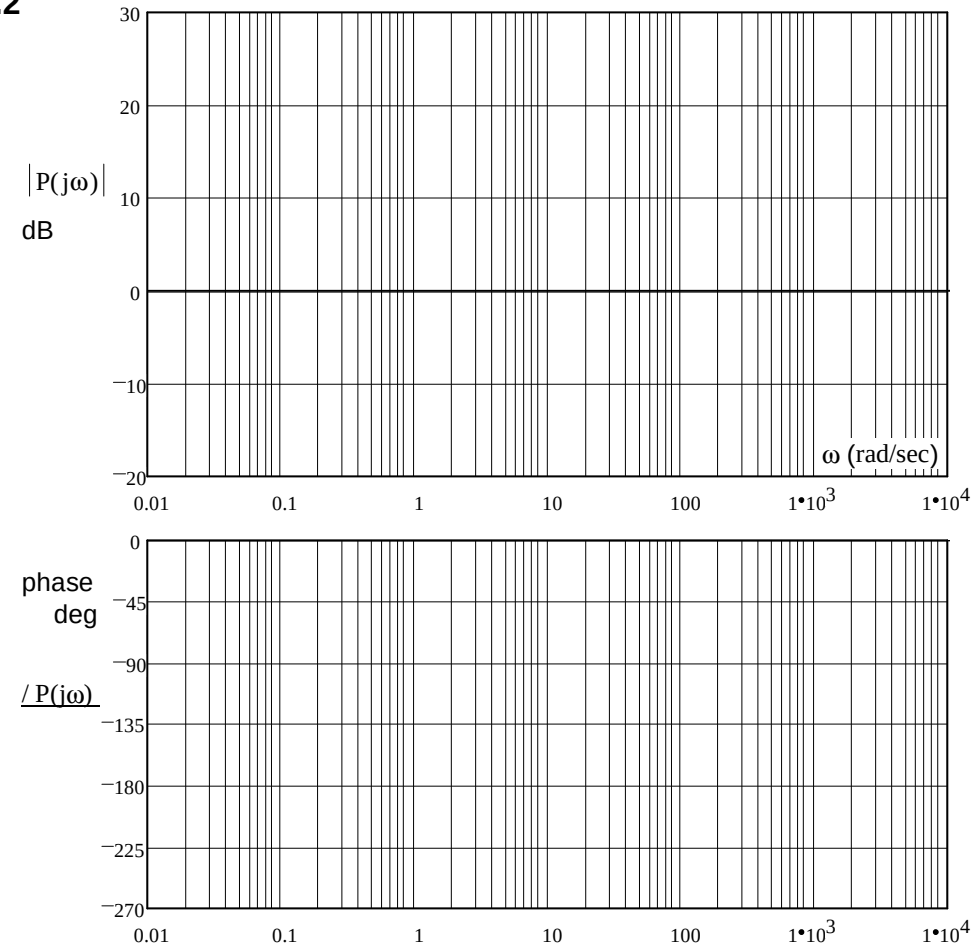


Ex. 2 $P(s) = \dfrac{s+20}{4\cdot(s+1)^2}$

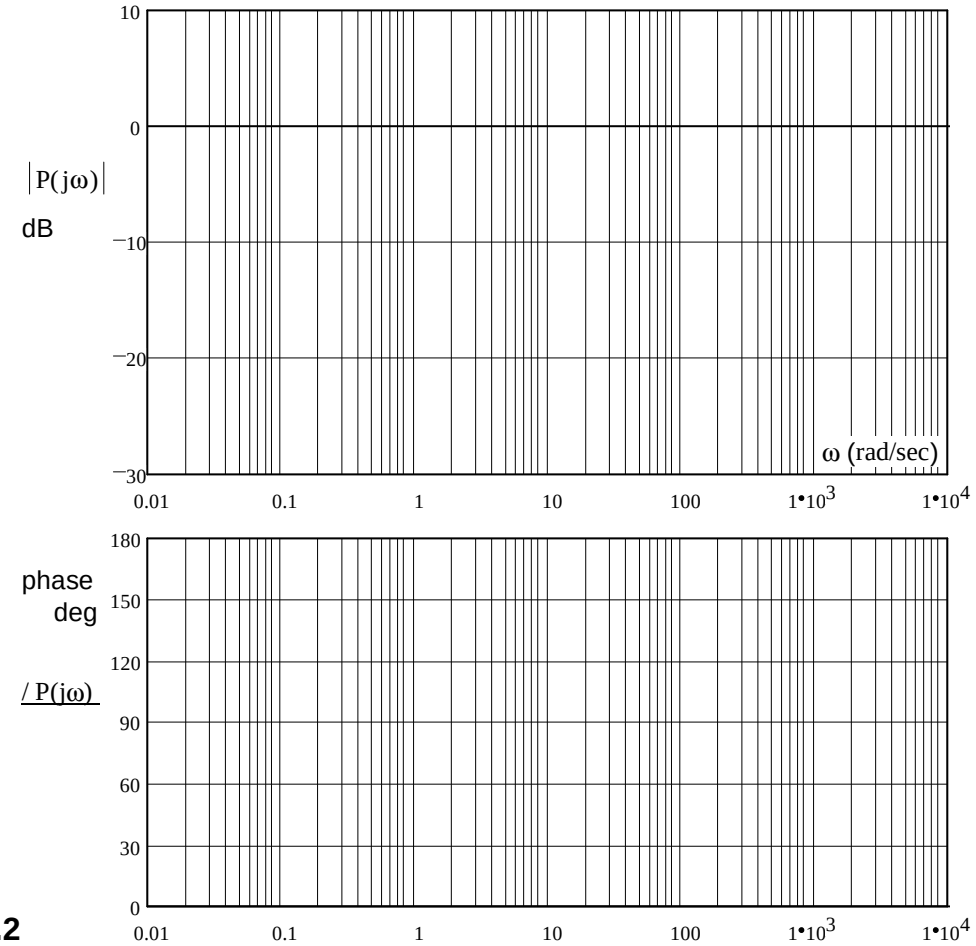


Ex. 3

$$P_3(s) := \frac{20000\cdot(-s+0.1)}{(s+4)\cdot(s+1000)}$$



Ex. 4 $$P_4(s) := \frac{0.5\cdot(s+1)\cdot(s-20)}{s\cdot(s+100)}$$



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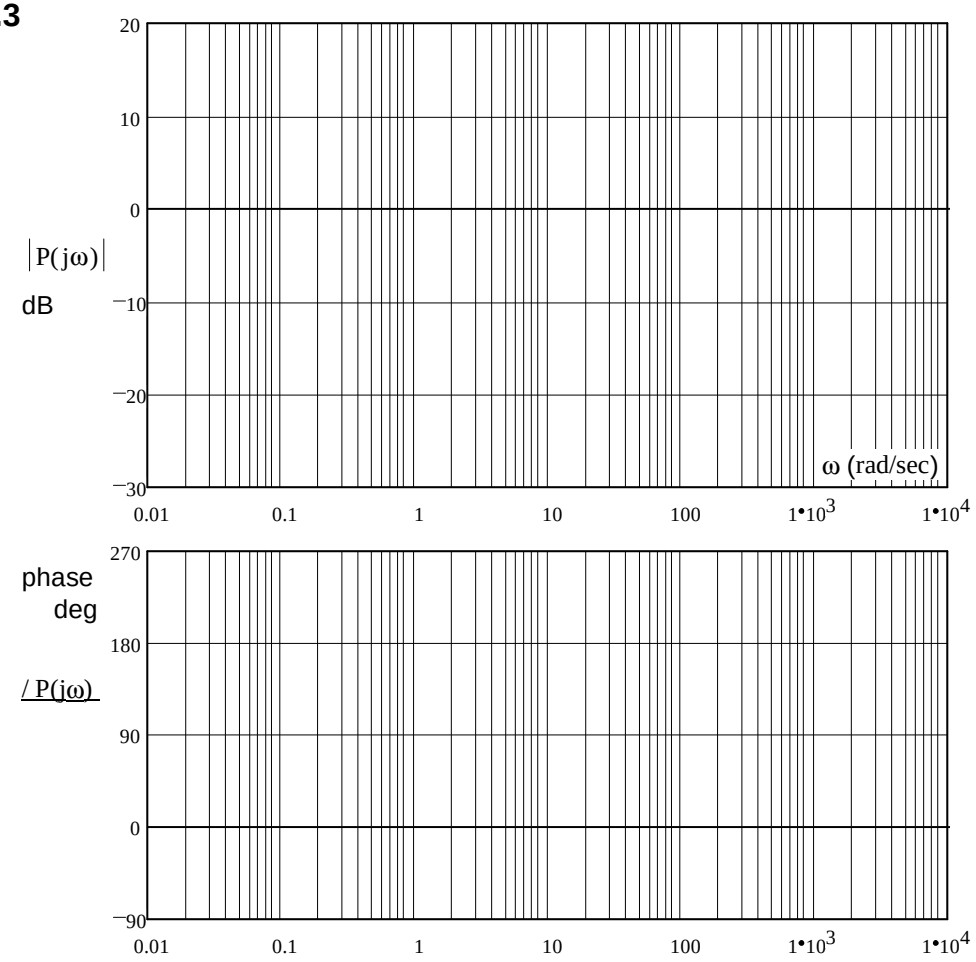
Ex. 5

$$P_5(s) := \frac{5000 \cdot s \cdot (s - 4)}{(s + 0.2) \cdot (s + 20) \cdot (s + 1000)}$$



Ex. 6

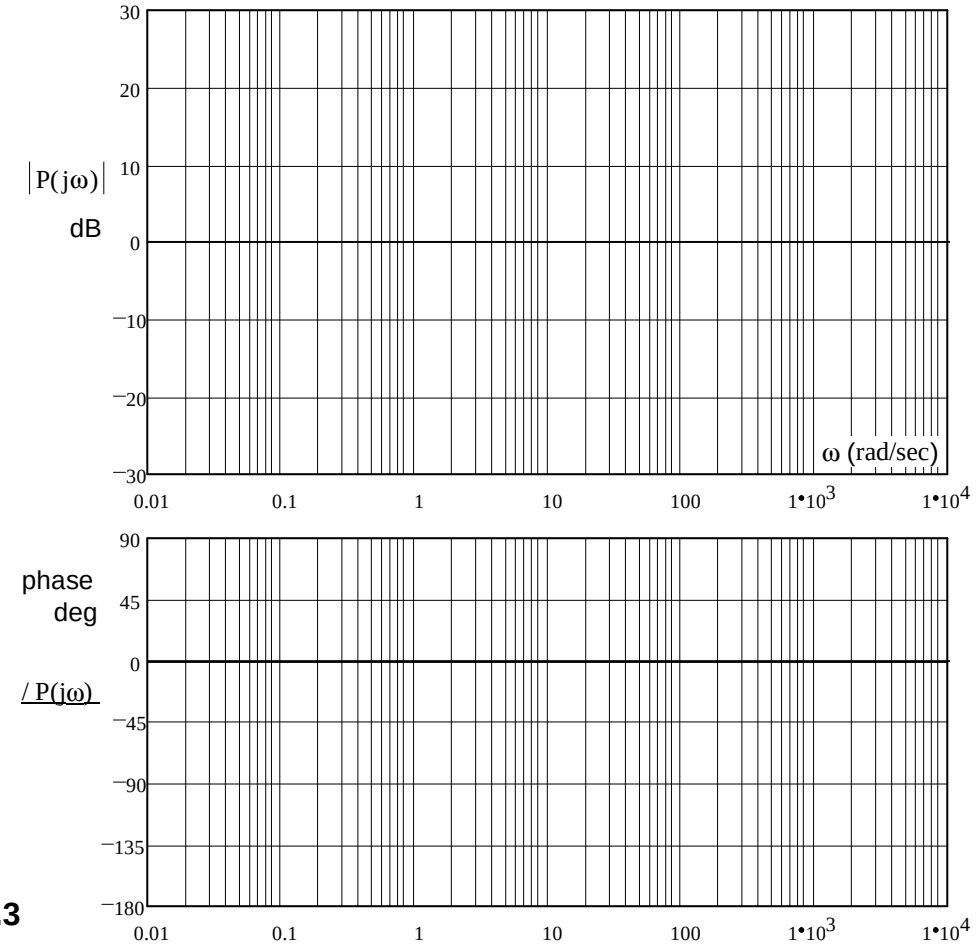
$$P_6(s) := \frac{20000 \cdot (s + 0.1)}{(s + 2) \cdot \left(s^2 + 10 \cdot s + 10000\right)}$$

$$s^2 + 2 \cdot \zeta \cdot \omega_n \cdot s + \omega_n^2$$

natural frequency $\omega_n = \sqrt{\omega_n^2} =$

damping factor: $\zeta = \frac{2 \cdot \zeta \cdot \omega_n}{2 \cdot \omega_n} =$

peak: $20 \cdot \log\left(\frac{1}{2 \cdot .05}\right) = 20$



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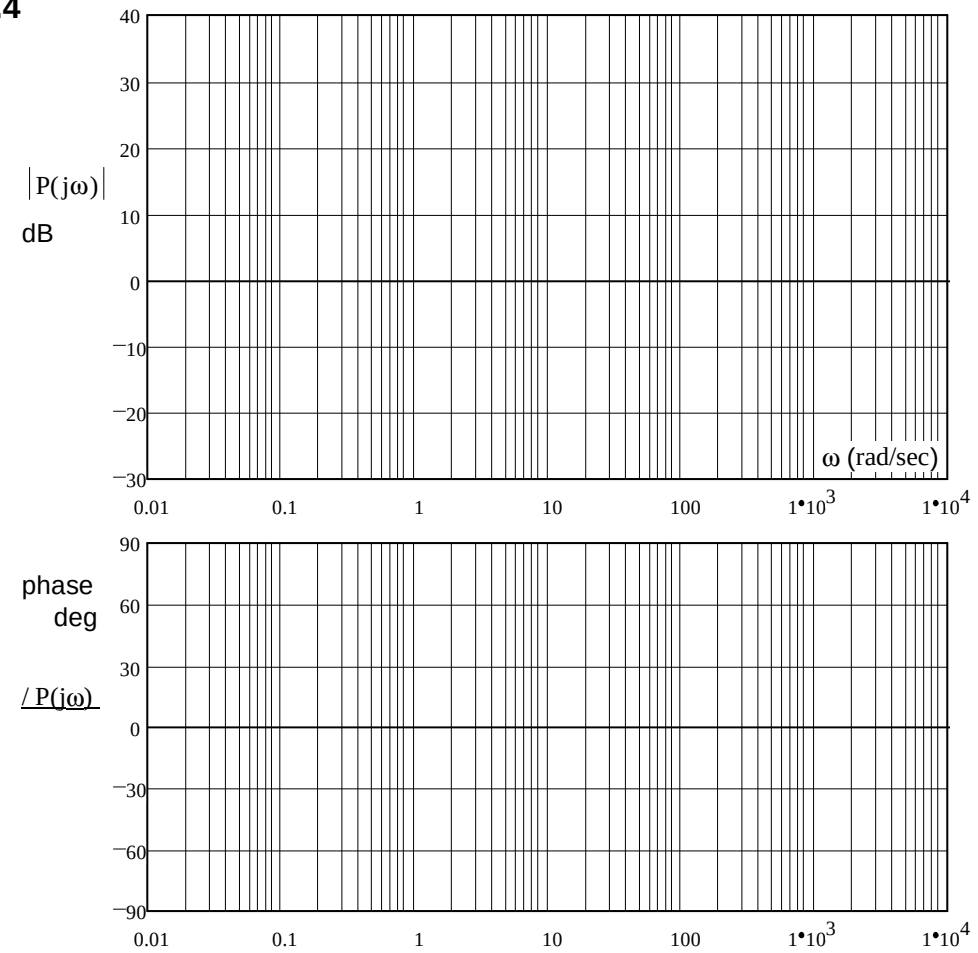
Ex. 7

$$P_7(s) := \frac{400\cdot(s+0.1)\cdot(s+100)}{\left[(s+0.4)^2+15.84\right]\cdot(s+1000)}$$

natural freq. $(s+a)^2+b^2$

$\omega_n = \sqrt{a^2+b^2}$ =

damping factor: $\zeta = \frac{a}{\zeta}$ = $\frac{1}{2\cdot\zeta}$ =



Ex. 8 $(s+a)^2+b^2$

$$P_8(s) := \frac{25\cdot\left[(s+10)^2+9900\right]}{\left(s^2+s+4\right)\cdot(s+2000)}$$

$s^2+2\cdot\zeta\cdot\omega_n\cdot s+\omega_n^2$

natural frequency $\omega_{n1} = \sqrt{\omega_{n1}^2}$ =

damping factor: $\zeta = \frac{2\cdot\zeta\cdot\omega_{n1}}{2\cdot\omega_{n1}}$ =

natural freq. $\omega_{n2} = \sqrt{a^2+b^2}$ =

damping factor: $\zeta = \frac{a}{\zeta}$ = $\frac{1}{2\cdot\zeta}$ =