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آب ان
پنجشنبه
١٩ ربیع الاول ١٤٤٢

5
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Thursday

810122422

HW11

محمد

$$1) G(s) = \frac{1}{s^3 + 0.2s^2 + s + 1}$$

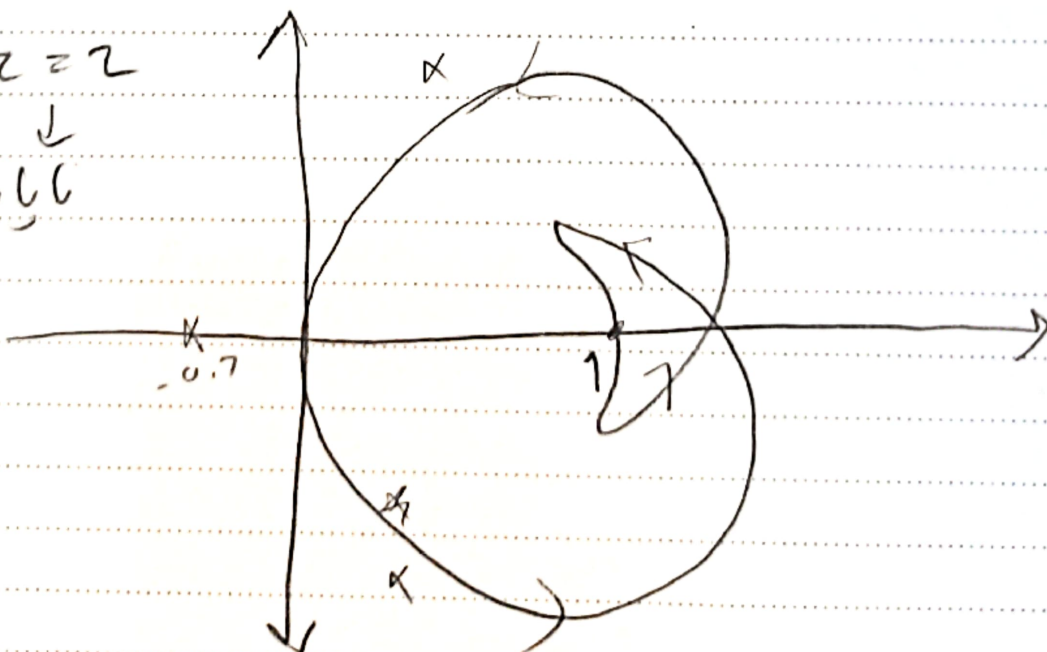
$$\Rightarrow G(j\omega) = \frac{1}{(1 - 0.2\omega^2) + j(\omega - \omega^3)}$$

$$G(j\omega) = \frac{1}{\sqrt{(1 - 0.2\omega^2)^2 + (\omega - \omega^3)^2}} \quad \angle -\tan^{-1}\left(\frac{\omega - \omega^3}{1 - 0.2\omega^2}\right)$$

$$s^3 + 0.2s^2 + s + 1 = 0 \Rightarrow s = \begin{cases} s_1 \approx -0.7245 \\ s_{2,3} \approx 0.262 \pm 1.145j \end{cases}$$

	0^+	1^-	1^+	∞
مقدار	0	1.118	1.118	0
زاویه	0°	0°	0°	$\pm 90^\circ$

$P=2$
 $N=0$
 $z=2$
 \downarrow
 R پلک



$$G(s) = \frac{s^3 + 2s + 1}{s^3 + 0.2s^2 + s + 1} \Rightarrow G(j\omega) = \frac{1 - \omega^2 + 2j\omega}{(1 - 0.2\omega^2) + j\omega(\omega^2 - 1)}$$

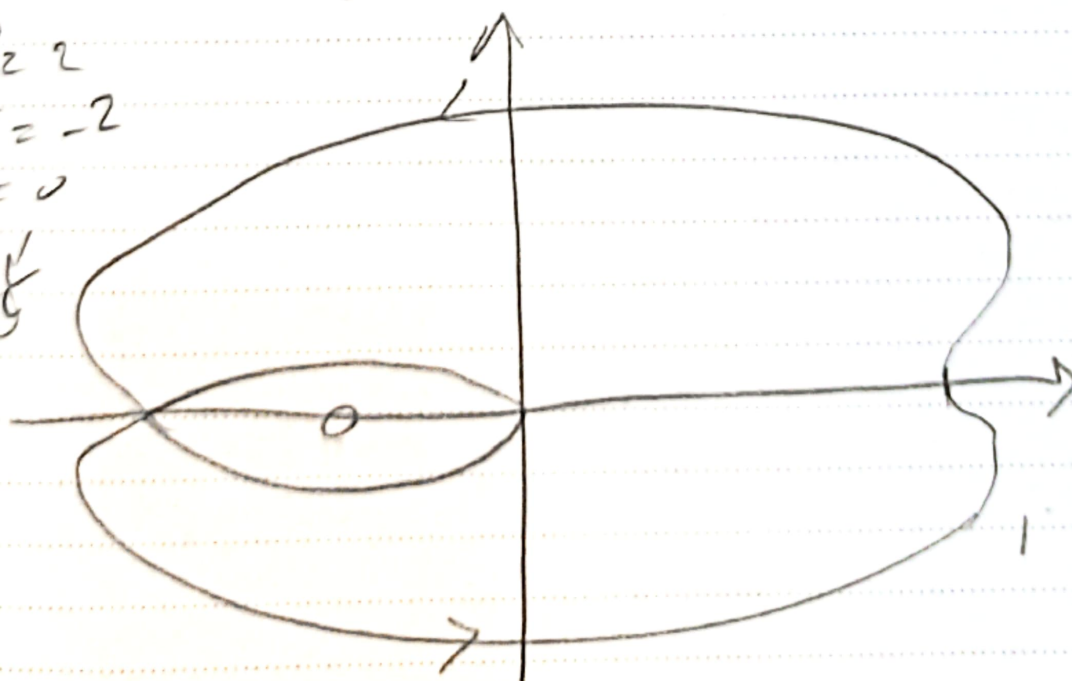
$$\Rightarrow G(j\omega) = \frac{\sqrt{(1 - \omega^2)^2 + 4\omega^2}}{\sqrt{(1 - 0.2\omega^2)^2 + (\omega^2 - 1)^2}} \angle -\tan^{-1}\left(\frac{\omega - \omega^3}{1 - 0.2\omega^2}\right) + \tan^{-1}\left(\frac{2\omega}{1 - \omega^2}\right)$$

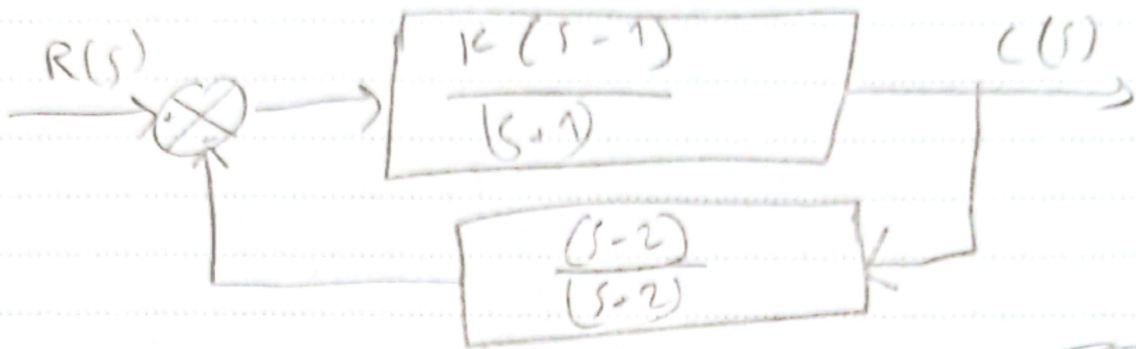
$$\text{Poles } \left\{ \begin{array}{l} z_{1,2} = -1 \end{array} \right.$$

$$\text{Poles } \left\{ \begin{array}{l} p_1 = -0.7245 \\ p_{2,3} = 0.262 \pm j1.145 \end{array} \right.$$

	0 ⁺	1 ⁻	1 ⁺	∞
$a(s)$	1	∞	∞	0
$b(s)$	0	$\tan(\infty)$ +90	$\tan(-\infty)$ -90	270 -90
		-270		

$P_z = 2$
 $N = -2$
 $Z = 0$
 stable





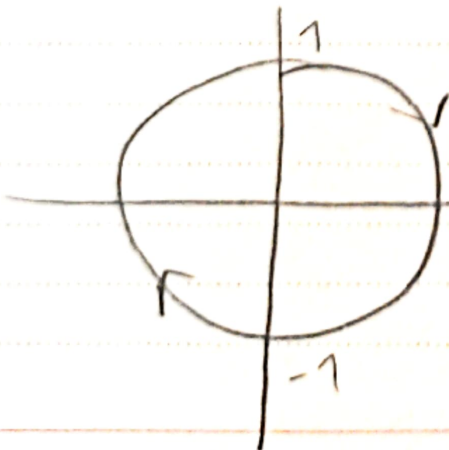
$$T(s) = G(s)H(s) = \frac{K(s-1)(s-2)}{(s+1)(s+2)} \Rightarrow T(s) = \frac{K(s-1)(s-2)}{(s+1)(s+2)}$$

$$T(j\omega) = \frac{K(j\omega-1)(j\omega-2)}{(j\omega+1)(j\omega+2)}$$

$$T(j\omega) = \left| \frac{K \sqrt{(w^2+1)(w^2+4)}}{\sqrt{(w^2+1)(w^2+4)}} \right| \angle \left(\tan^{-1}\left(\frac{-w}{1}\right) + \tan^{-1}\left(\frac{-w}{2}\right) - \tan^{-1}\left(\frac{w}{1}\right) - \tan^{-1}\left(\frac{w}{2}\right) \right)$$

$$= -2 \left(\tan^{-1}(w) + \tan^{-1}\left(\frac{w}{2}\right) \right)$$

	0^+	1^-	1^+	2^-	2^+	∞
\angle	K	K	K	K	K	K
\angle	0	-143	-143	-216	-216	$-360 = 0$



$$P_{20} = 2_{20} \Rightarrow 2_{20}$$

$$-1 < K < 1$$

$$4) \frac{(s+3)e^{-Ts}}{s^2+s} = \frac{(s+3)e^{-Ts}}{s(s+1)} \Rightarrow$$

ایچ ناکید نیست

$$G(s) = \frac{(s+3)}{s(s+1)} \Rightarrow G(j\omega) = \frac{j\omega+3}{j\omega(j\omega+1)} = \frac{\sqrt{(\omega^2+9)}}{\omega\sqrt{(\omega^2+1)}} \angle -\frac{\pi}{2} - \tan^{-1}(\omega) + \frac{\pi}{2} + \tan^{-1}\left(\frac{\omega}{3}\right)$$

$$|G(j\omega)| = 1 \Rightarrow \sqrt{\omega^2+9} = \omega\sqrt{\omega^2+1} \Rightarrow \omega^2+9 = \omega^4+\omega^2 \Rightarrow \omega^2=9 \Rightarrow \omega=3$$

$$\omega = \sqrt{3}$$

$$\angle G(j\omega) = -180^\circ + \angle \omega$$

$$-90^\circ - \tan^{-1}(\sqrt{3}) + \tan^{-1}\left(\frac{\sqrt{3}}{3}\right) = -180^\circ + \sqrt{3} + \frac{180^\circ}{\pi}$$

$$-90^\circ - 60^\circ + 30^\circ = -180^\circ + \sqrt{3} + \frac{180^\circ}{\pi}$$

$$60^\circ = \sqrt{3} + \frac{180^\circ}{\pi} \Rightarrow \frac{\pi}{3\sqrt{3}} = \angle$$

$$\Rightarrow \angle = 0.6046$$

مکان هکس (۰.۶۰۴۶)

$$e^{-Ts} = \frac{1 - \frac{T}{2}s}{1 + \frac{T}{2}s} \Rightarrow G(s) = \frac{(s+3)}{s(s+1)} \frac{(1 - \frac{T}{2}s)}{(1 + \frac{T}{2}s)} \Rightarrow G(j\omega) = \frac{(j\omega+3)(1 - \frac{T}{2}j\omega)}{j\omega(j\omega+1)(1 + \frac{T}{2}j\omega)}$$

$$\Rightarrow G(j\omega) = \frac{\sqrt{(\omega^2+9)(1+\frac{T^2}{4}\omega^2)}}{\omega\sqrt{(\omega^2+1)(1+\frac{T^2}{4}\omega^2)}} \angle -90^\circ - \tan^{-1}(\omega) - \tan^{-1}\left(\frac{\omega T}{2}\right) + \tan^{-1}\left(\frac{\omega}{3}\right) + \tan^{-1}\left(\frac{\omega T}{2}\right)$$

$$|G(j\omega)| = 1 \Rightarrow \omega = \sqrt{3}$$

$$\angle G = -90^\circ - \tan^{-1}(\sqrt{3}) + \tan^{-1}\left(\frac{\sqrt{3}}{3}\right) - \tan^{-1}\left(\frac{\sqrt{3}T}{2}\right) + \tan^{-1}\left(\frac{\sqrt{3}T}{2}\right) = -180^\circ$$

ولادت حضرت رسول اکرم صلی الله علیه وآله وسلم (۵۴ سال قبل از هجرت) و روز اخلاق و مهرورزی - ولادت حضرت امام جعفر صادق علیه السلام مؤسس مذهب جعفری (۸۲ هـ) (تعمیل) - تسخیر لانه جاسوسی آمریکا به دست دانشجویان پیرو خط امام (۱۳۵۸ هـ ش) - روز ملی مبارزه با استعمار جهانی - روز دانش آموز

$$-2 \tan^{-1}\left(\frac{\sqrt{3}t_d}{2}\right) = -60$$

$$\tan^{-1}\left(\frac{\sqrt{3}t_d}{2}\right) = 30$$

$$\frac{\sqrt{3}}{3} = \frac{\sqrt{3}}{2} t_d \Rightarrow$$

$$t_d = \frac{2}{3} = 0.\overline{6} \checkmark$$