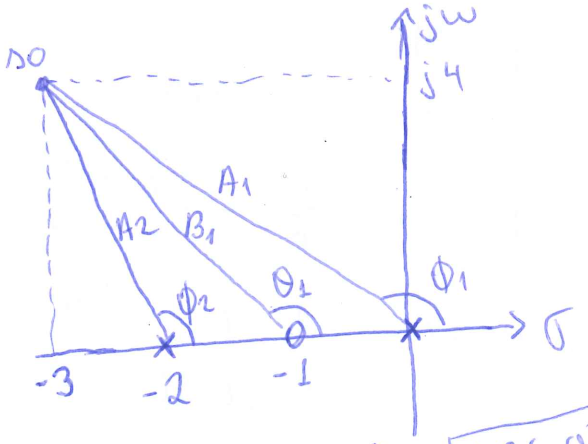
(Resolução Lista 05)

1) $G(s) = \dfrac{2(s+1)}{s(s+2)}$, $s_0 = -3 \pm j4$



$\phi_1 = 180^\circ - tg^{-1}\left(\dfrac{4}{3}\right) = \boxed{126,9^\circ}$

$\theta_1 = 180^\circ - tg^{-1}\left(\dfrac{4}{2}\right) = \boxed{116,6^\circ}$

$\phi_2 = 180^\circ - tg^{-1}\left(\dfrac{4}{1}\right) = \boxed{104^\circ}$

$|G(s_0)| = K.\dfrac{B_1}{A_1.A_2} = 2.\dfrac{\sqrt{2^2+4^2}}{\sqrt{3^2+4^2}.\sqrt{1^2+4^2}}$

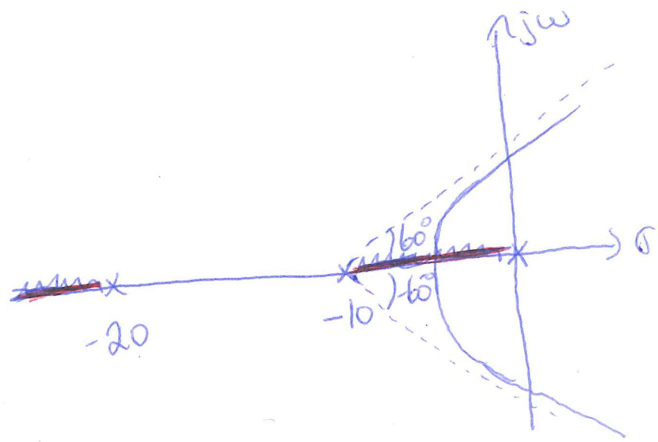
$|G(s_0)| = 2.\dfrac{4,47}{5.\ 4,12} = \boxed{0,434}$ //

$\angle G(s_0) = \theta_1 - \phi_1 - \phi_2$

$\angle G(s_0) = 116,6^\circ - 126,9^\circ - 104^\circ = \boxed{-114,3^\circ}$ //

---

2) $KG(s)H(s) = \dfrac{K}{s(s+10)(s+20)}$



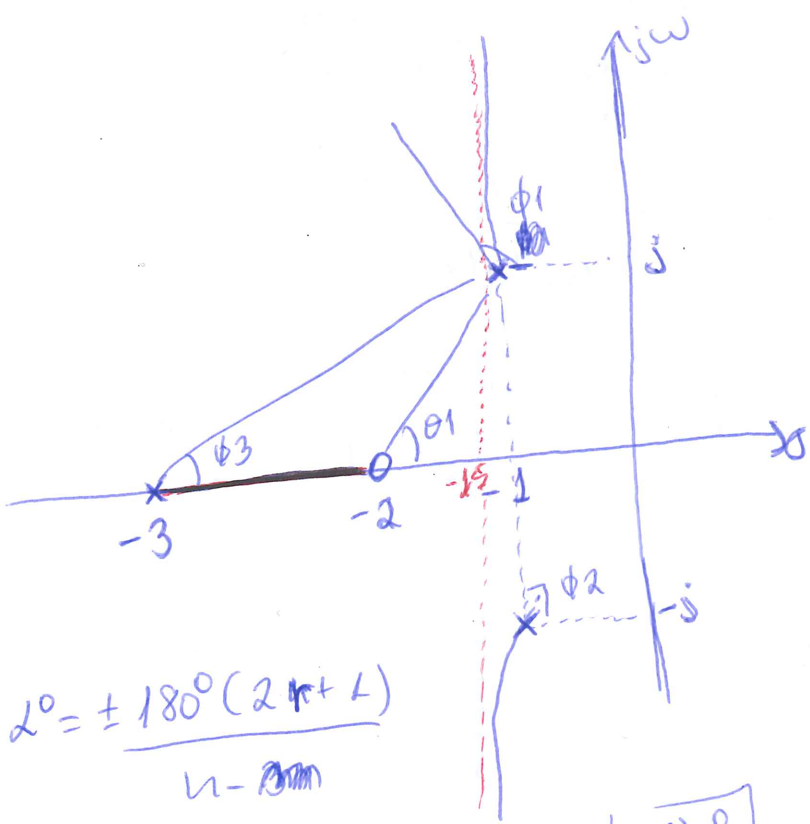
$\alpha^\circ = \dfrac{\pm 180^\circ(2r+1)}{n-m}$

$r=0 \therefore \alpha^\circ = \pm \dfrac{180^\circ(2.0+1)}{3} = \boxed{\pm 60^\circ}$

$r=1 \therefore \alpha^\circ = \pm \dfrac{180^\circ(2.1+1)}{3} = \boxed{\pm 180^\circ}$

$S_c = \dfrac{\sum p - \sum z}{n-m} = \dfrac{0-10-20}{3} = -10$

3) $1+K\,G(s) = 1 + \dfrac{K(s+2)}{(s+3)(s^2+2s+2)}$



$$\alpha^\circ = \frac{\pm 180^\circ (2r+1)}{n-m}$$

$$r=0 \therefore \alpha^\circ = \frac{\pm 180^\circ(2.0+1)}{3-1} = \boxed{\pm 90^\circ}$$

$$r=1 \therefore \alpha^\circ = \frac{\pm 180^\circ(2.1+1)}{3-1} = \boxed{\pm 180^\circ}$$

$\phi_2 = \boxed{90^\circ}$

$\theta_1 = tg^{-1}\left(\frac{1}{1}\right) = \boxed{45^\circ}$

$\phi_3 = tg^{-1}\left(\frac{1}{2}\right) = \boxed{26{,}56^\circ}$

$-\phi_1 + \theta_1 - \phi_2 - \phi_3 = 180^\circ$

$-\phi_1 + 45^\circ - 90^\circ - 26{,}56^\circ = 180^\circ$

$\boxed{\phi_1 = -251{,}56^\circ \text{ ou } 108{,}44^\circ}$

$$S_c = \frac{\sum P - \sum Z}{n-m} = \frac{-1-1-3+2}{3-1} = \boxed{-1{,}5}$$