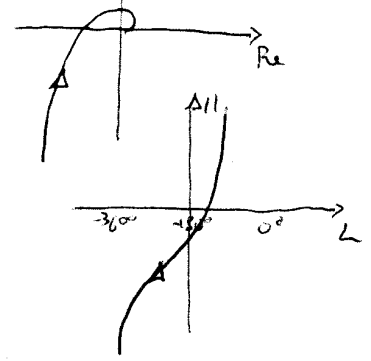
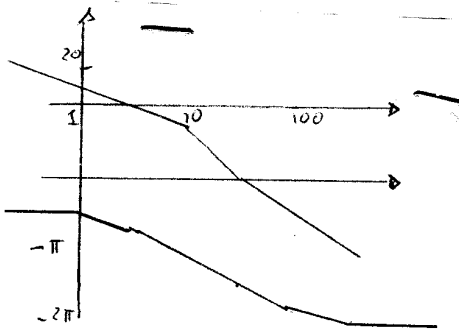


$$G(s) = \frac{3}{s} \frac{(1 - \frac{s}{30})}{(1 + \frac{s}{10})^2}$$

NON AS. STABILE
NON E' UN FILTRO



2) a) L'impulso e' $v(t) = t \cdot 1(t) - 2(t-1)1(t-1) + (t-2)1(t-2)$

Risposta alla rampa unitaria: $Y_2(s) = \frac{100(s+10)}{s(s+10)(s+1)} = \frac{10}{s} - \frac{100}{s+1} - \frac{10}{s+10}$

$$y_2(t) = \left[10 - \frac{100}{11} e^{-t} - \frac{10}{11} e^{-100t} \right] 1(t)$$

$$y(t) = y_2(t) - 2 \cdot y_2(t-1) + y_2(t-2)$$

b) $G(j\omega) = \frac{j\omega(10+j\omega)}{(1+j\omega)(1+j\omega)}$

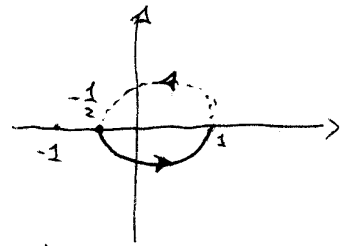
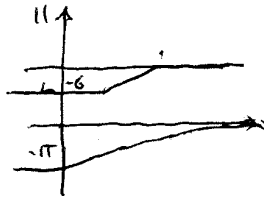
$$|G(j\omega)| = \frac{3 \cdot \sqrt{109}}{\sqrt{10} \cdot \sqrt{1}} = 9.9$$

$$\angle G(j\omega) = \frac{\pi}{2} + \arctan(0.3) - \arctan(0.03) - \arctan(3) = 1.57 + 0.29 - 0.03 - 1.25 = +0.58$$

$$y(1) = 4 \cdot 9.9 \text{ mm } (3t - 0.1 + 0.58)$$

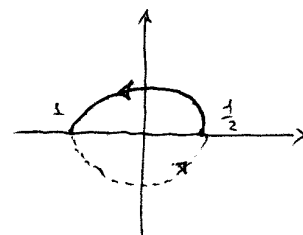
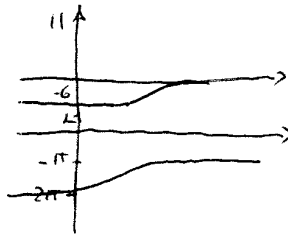
3) $F(s) = k \frac{s+1}{s-2} =$
 $= -\frac{k}{2} \frac{1+s}{1-\frac{s}{2}}$

Per $k=1$



Per l'as. stabilita' dev' essere $k > 2$

Per $k=-1$



Per l'as. stabilita' dev' essere $k < -1$

$$e_n = \frac{k_p \cdot R}{k_p + k_G} = \frac{1 \cdot 4}{1 - \frac{k}{2}}$$

ad es., per $k=4$

$$e_n = -4$$

4) $G(z) = \frac{z-A}{A(z+\frac{z}{A})}$

$|A| > 2$

Per $A=4$ $Y(z) = \frac{z-4}{4(z+0.5)} \cdot \frac{z}{(z-1)} = \frac{z}{4} \left(\frac{3}{z+0.5} + \frac{-2}{z-1} \right)$

$$y(k) = \left[-2 + 3 \left(-\frac{1}{2} \right)^k \right] 1(k)$$