

$$G(s) = \frac{10(s+9)}{(s+3)^2(s-5)} = \frac{A}{s+3} + \frac{B}{s-5} + \frac{C}{(s+3)^2}$$

Zeri $s+9=0$ $s=-9$

Poli: $s+3=0$ $s=-3$ molteplicità 2

$s-5=0$ $s=5$

$$g(t) = Ae^{-3t} + Be^{5t} + Cte^{-3t}$$

Guadagno statico $G(0) = \frac{10 \cdot 9}{9 \cdot (-5)} = -2$

$$|G(s)|_{dB} = 20 \log(10) + 20 \log|s+9| - 40 \log|s+3| - 20 \log|s-5|$$

$$\varphi = \arctg \frac{s}{9} - 2 \arctg \frac{s}{3} - \arctg \frac{s}{5}$$

$$G(s) = \frac{s-12}{s^2+9s+20}$$

$$s^2+9s+20=0 \quad \Delta=81-80=1 \quad s = \frac{-9 \mp 1}{2} = -5 \quad -4$$

$$s^2+9s+20 = (s-(-5))(s-(-4)) = (s+5)(s+4)$$

$$G(s) = \frac{s-12}{(s+5)(s+4)}$$

Zeri: $s=34$ molt 1 $s=12$ molt 2

Poli $s=-6$ molt 1 $s=10$ molt 1 $s=14$ molt 3

$$G(s) = \frac{(s-34)(s-12)^2}{(s+6)(s-10)(s-14)^3} = \frac{A}{s+6} + \frac{B}{s-10} + \frac{C}{s-14} + \frac{D}{(s-14)^2} + \frac{E}{(s-14)^3}$$

$$g(t) = Ae^{-6t} + Be^{10t} + Ce^{14t} + Dte^{14t} + Et^2e^{14t}$$

Esercizio:

Ricavare: poli, zeri, modulo in dB, sfasamento, guadagno statico e antitrasformata delle seguenti funzioni di trasferimento nel dominio delle frequenze:

$$G(s) = \frac{0.01(s + 88)}{(s - 11)(3s + 9)} \quad G(s) = \frac{25(2s - 7)}{(3s - 12)(4s + 9)s}$$