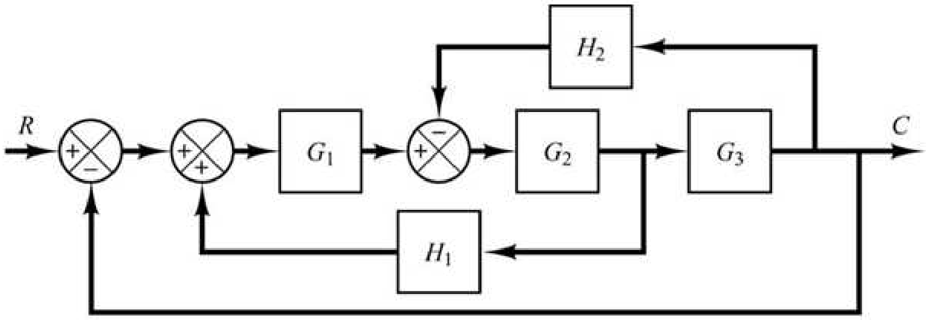
3. GAIA

SISTEMEN KANPOKO ADIERAZPENA

3.1 ARIKETA

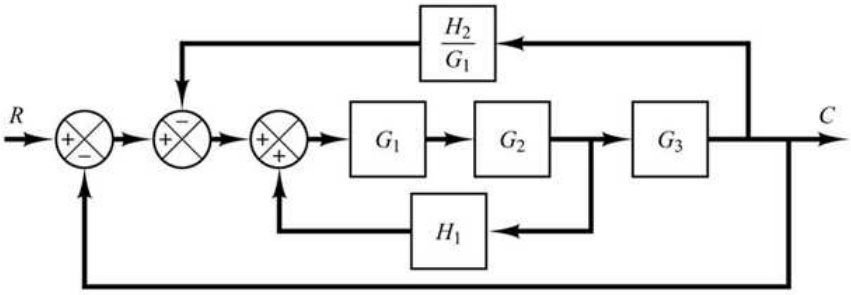
Blokeen sinplifikazio metodoak erabiliz ondoko bloke-diagrama sinplifikatu G(s)= C(s)/R(s).

(a)

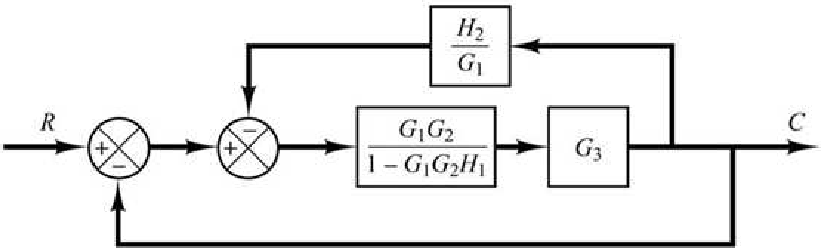


Emaitza:

(b)



(c)



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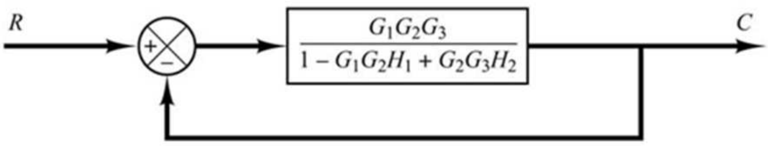
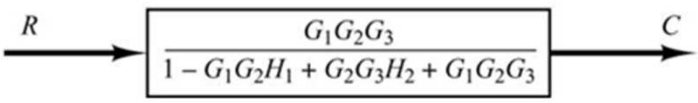


(e)



$$\frac{G_1G_2G_3}{1 - G_1G_2H_1 + G_2G_3H_2 + G_1G_2G_3}$$

3.2 ARIKETA

Demagun ondoko ekuazio-sistema:

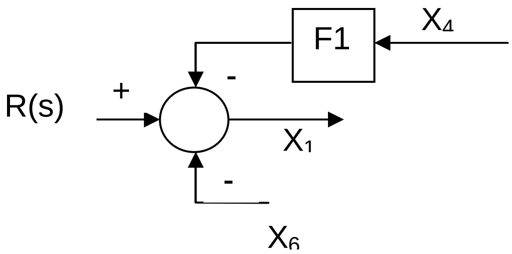
$$X1(s) = R(s) - F1(s)\,X4(s) - X6(s)$$
$$X2(s) = G1(s)\,X1(s)$$
$$X3(s) = G2(s)\,X4(s)$$
$$X4(s) = X2(s) - X3(s)$$
$$X5(s) = G3(s)\,X3(s)$$
$$X6(s) = X5(s) + X4(s)$$
$$Y(s) = K\,X6(s)$$

Non G1(s), G2(s), G3(s), F1(s) transferentzi funtzioak diren, R(s) sistemaren sarrera izanik eta Y(s) sistemaren irteera. Eskatzen dena:

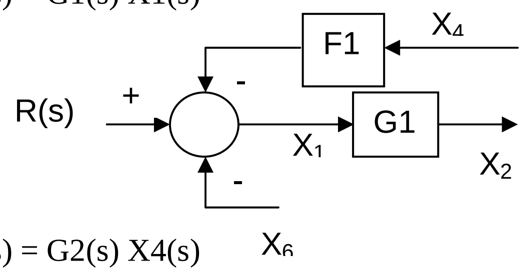
1) Ekuazio-sistemari dagokion bloke-diagrama irudikatu.

Emaitza

$X1(s) = R(s) - F1(s)\,X4(s) - X6(s)$

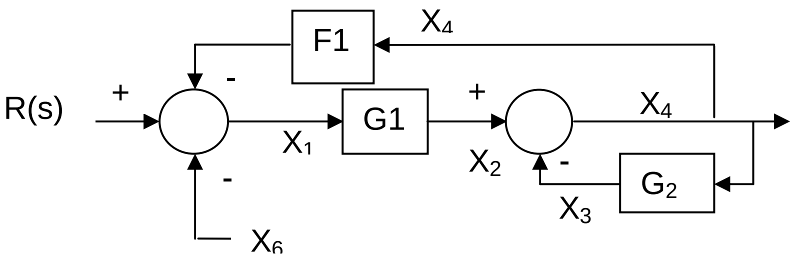


$X2(s) = G1(s)\,X1(s)$

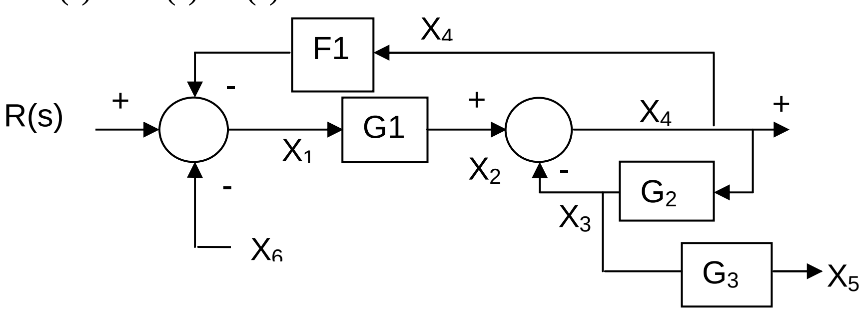


$X3(s) = G2(s)\,X4(s)$

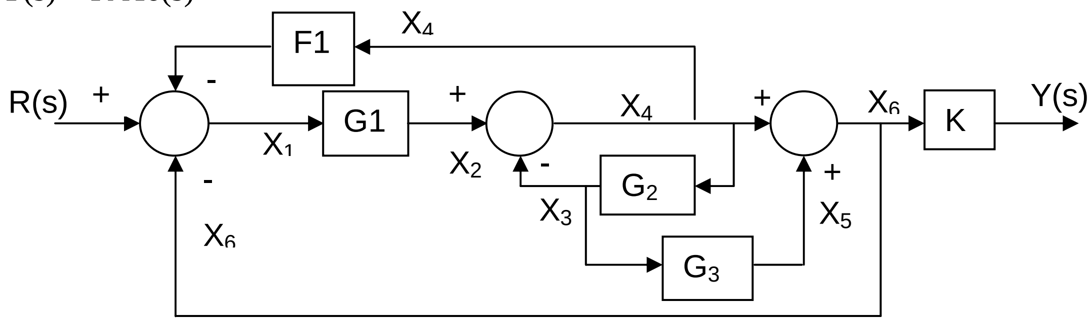
$X4(s) = X2(s) - X3(s)$



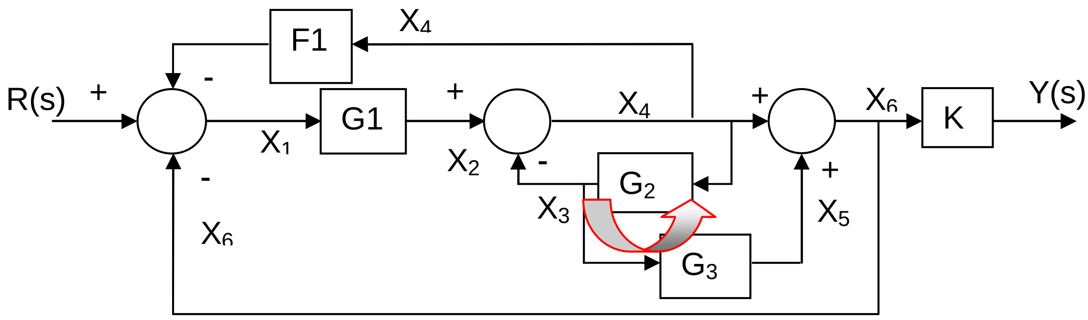
$X5(s) = G3(s)\,X3(s)$

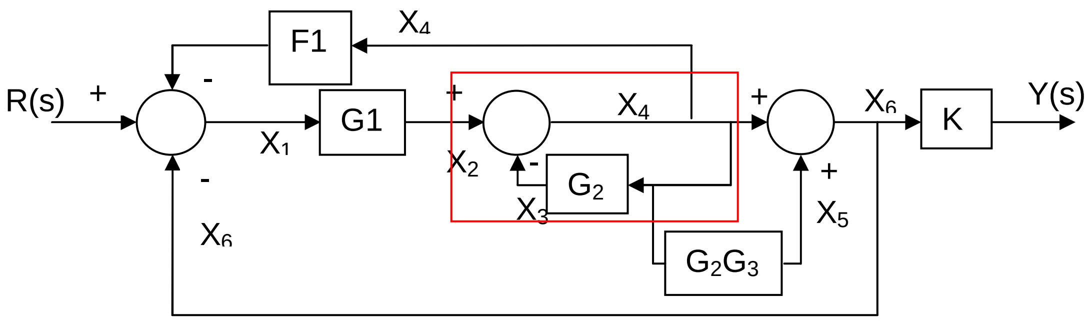


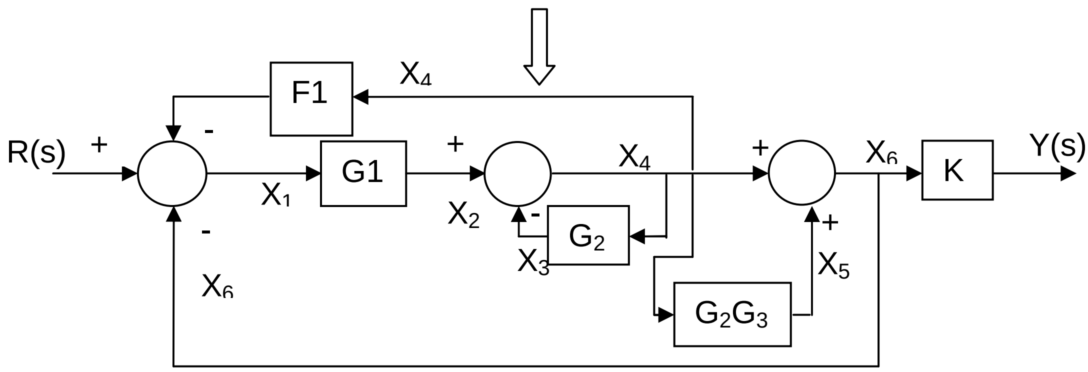
$X6(s) = X5(s) + X4(s)$
$Y(s) = K\ X6(s)$

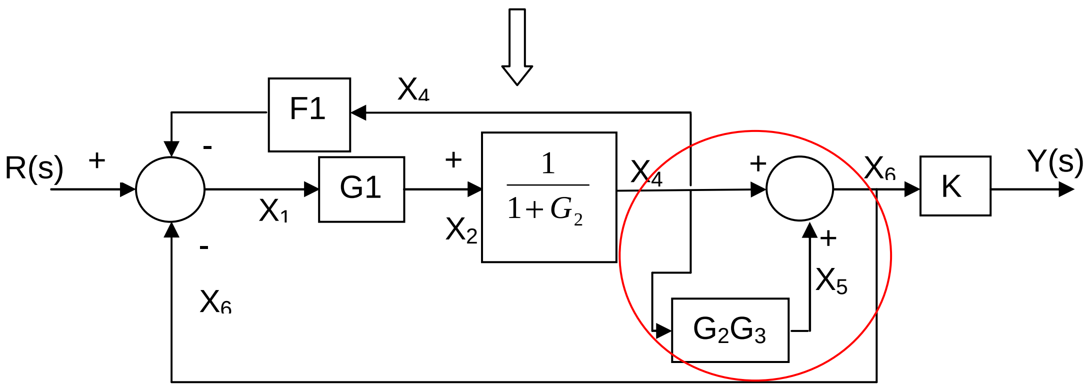


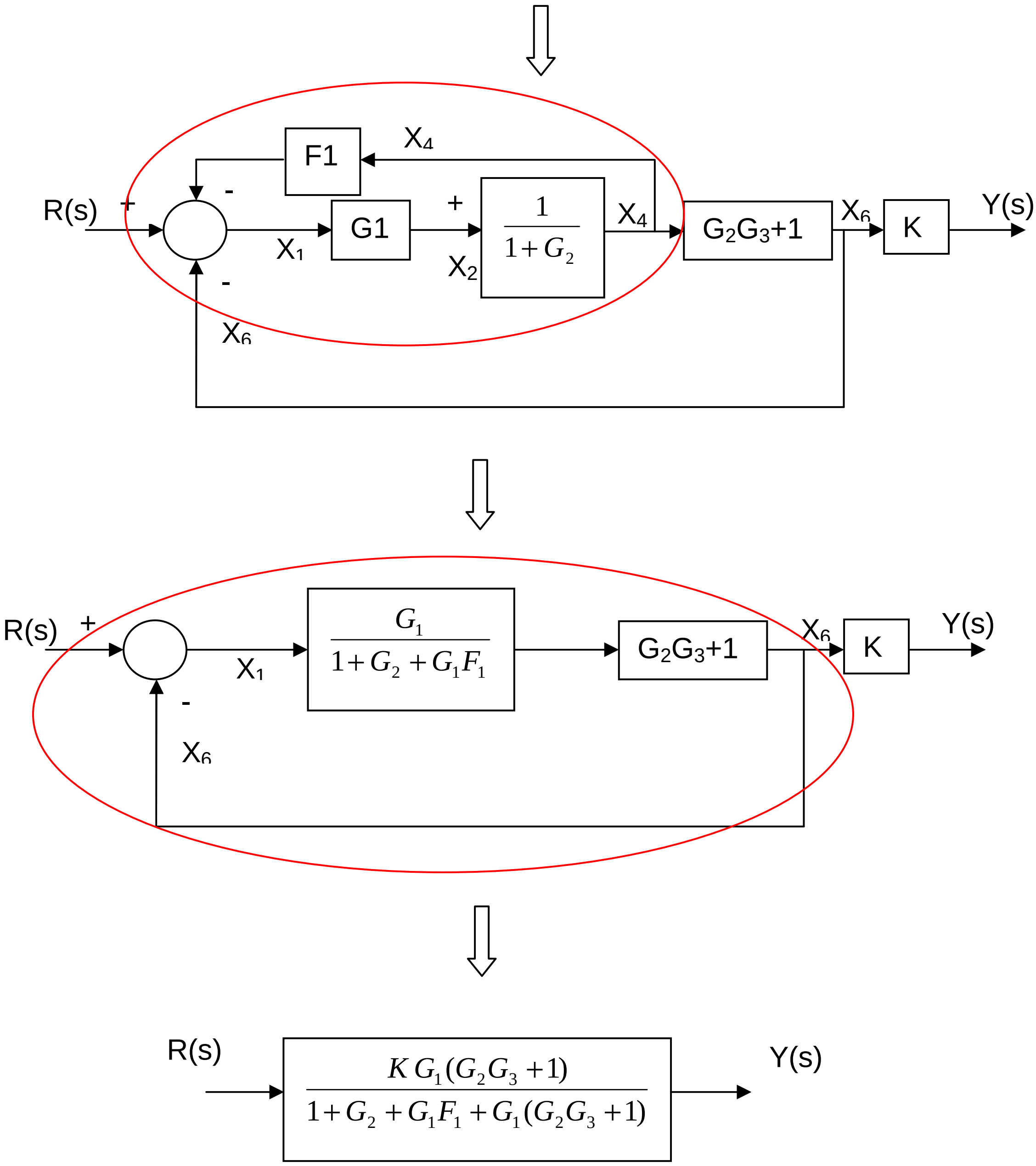
2) **Diagrama sinplifikatu, sinplifikazio teknikak erabiliz.**





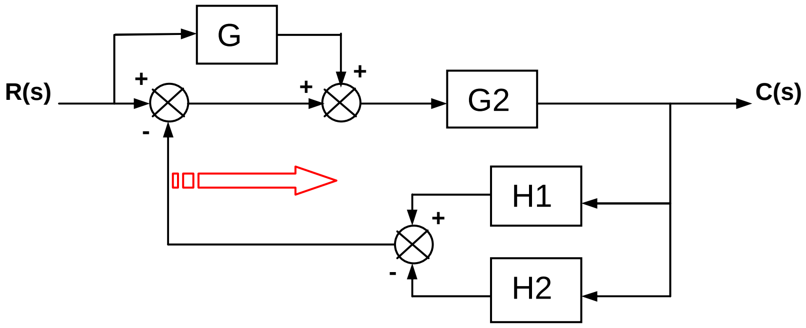




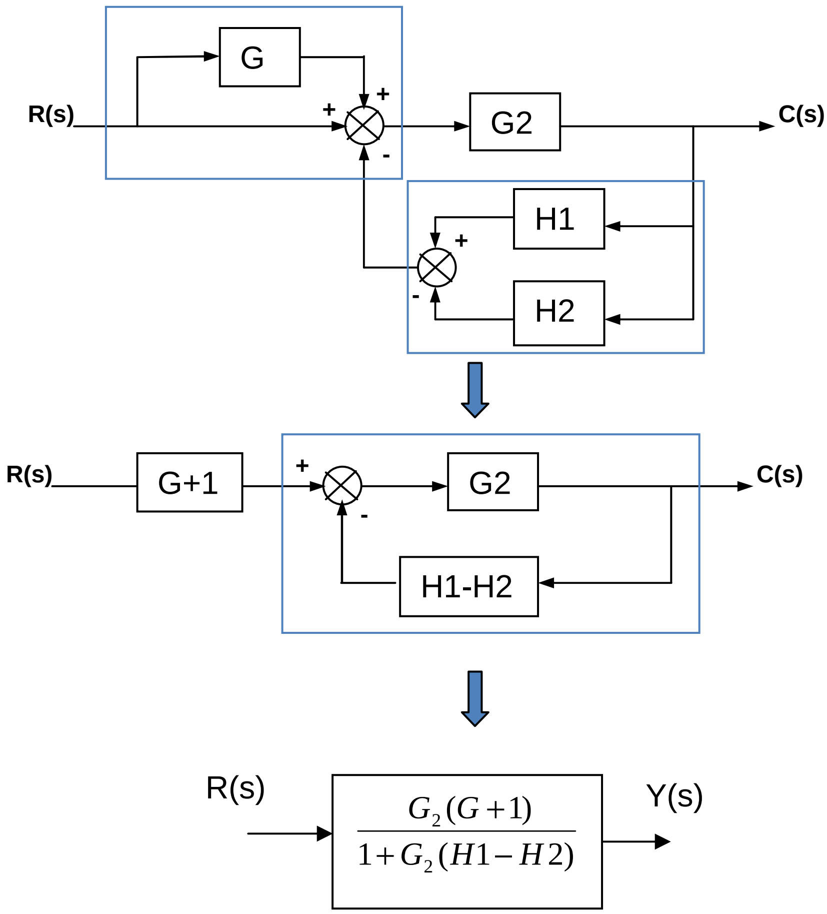

R(s)
+
-
F1
X4
G1
X1
+
X2
1/(1+G2)
X4
G2G3+1
X6
K
Y(s)
-
X6
R(s)
+
G1/(1+G2+G1F1)
X1
G2G3+1
X6
K
Y(s)
-
X6
R(s)
K G1(G2G3+1) / (1+G2+G1F1+G1(G2G3+1))
Y(s)

3.3 ARIKETA

Blokeen sinplifikazio metodoak erabiliz ondoko bloke-diagrama sinplifikatu G(s)= C(s)/R(s).



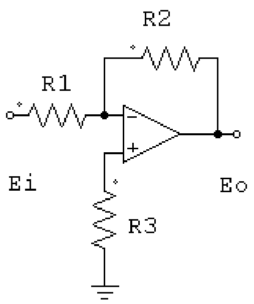
Emaitza:



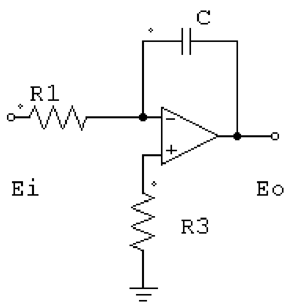
3.4 ARIKETA

Ondoko zirkuituen Transferentzi funtzioa kalkulatu:

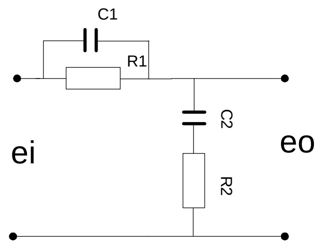
a)



b)



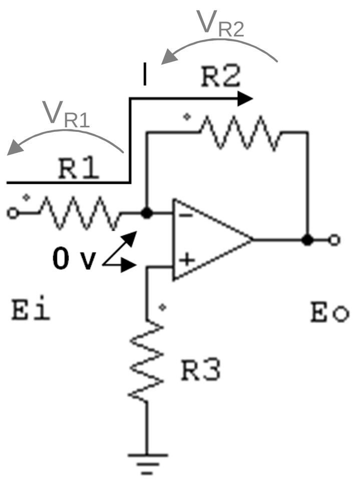
c)



Emaitza:

Ohmen Legea aplikatuz eta suposatuz anplifikadore operazional ideala:

a)

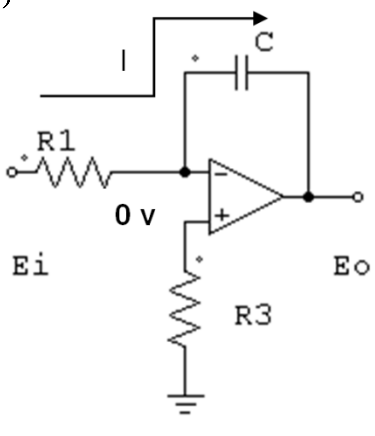


$$Ei(t) = R1\,I(t) \quad \Rightarrow Ei(s) = R1\,I(s)$$
$$Eo(t) = -R2\,I(t) \Rightarrow Eo(s) = -R2\,I(s)$$

$$\Downarrow$$

$$G(s) = \frac{Eo(s)}{Ei(s)} = -\frac{R2}{R1}$$

b)



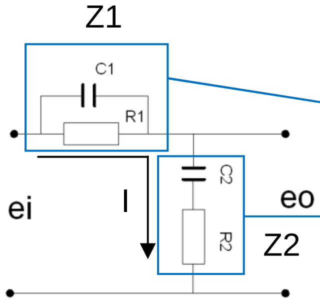
$$Ei(t) = R1\,I(t) \quad \Rightarrow Ei(s) = R1\,I(s)$$
$$Eo(t) = -\frac{1}{C}\int I(t)dt \Rightarrow Eo(s) = -\frac{1}{Cs}I(s)$$

$$\Downarrow$$

$$G(s) = \frac{Eo(s)}{Ei(s)} = -\frac{1}{R1\,C\,s}$$

c)

$$Vc=\frac{1}{C1}\int I(t)dt \quad \xrightarrow{Laplace} \quad Vc(s)=\frac{I(s)}{C1\,s} \Rightarrow Xc=\frac{Vc(s)}{I(s)}=\frac{1}{C\,s}$$



$$\frac{1}{Z1}=\frac{1}{R1}+\frac{1}{Xc1}=\frac{1}{R1}+C1s \Rightarrow Z1=\frac{R1}{1+R1C1\,s}$$

$$Z2=R2+Xc2=R2+\frac{1}{C2\,s} \Rightarrow Z2=\frac{1+R2C2\,s}{C2\,s}$$

Orduan:

$$Ei(s)=Vz1(s)+Vz2(s)=I(s)[Z1+Z2]=I(s)\left[\frac{R1}{1+R1C1\,s}+\frac{1+R2C2\,s}{C2\,s}\right]=I(s)\left[\frac{R1C2\,s+(1+R1C1\,s)(1+R2C2\,s)}{C2\,s\,(1+R1C1\,s)}\right]$$

$$Eo(s)=Vz2(s)=I(s)\frac{1+R2C2\,s}{C2\,s}$$

$$\Downarrow$$

$$G(s)=\frac{Eo(s)}{Ei(s)}=\frac{I(s)\dfrac{1+R2C2\,s}{C2\,s}}{I(s)\left[\dfrac{R1C2\,s+(1+R1C1\,s)(1+R2C2\,s)}{C2\,s\,(1+R1C1\,s)}\right]}=\frac{(1+R1C1\,s)(1+R2C2\,s)}{R1C2\,s+(1+R1C1\,s)(1+R2C2\,s)}$$