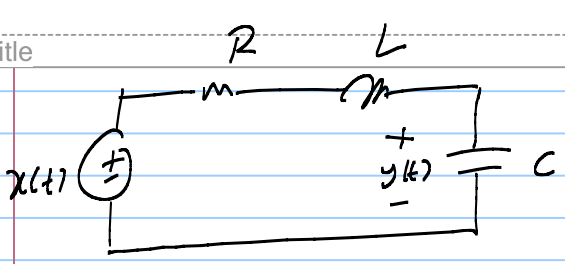
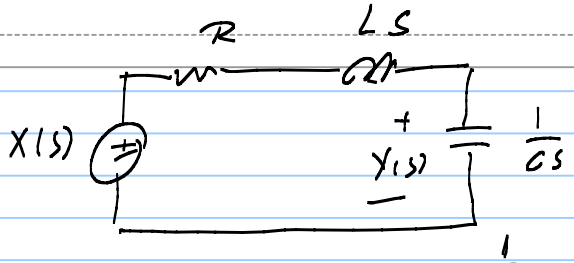
Note Title 4/26/2018



$\Rightarrow$

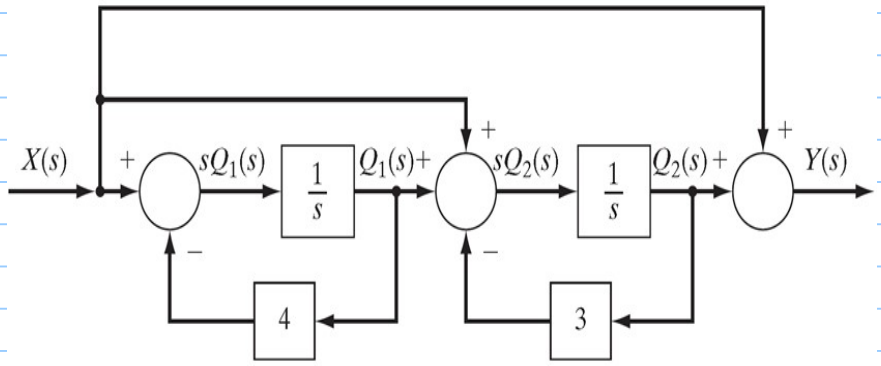


$$Y(s) = X(s)\,\frac{\frac{1}{Cs}}{R + Ls + \frac{1}{Cs}}$$

$$= X(s)\,\frac{1}{RCs + LCs^2 + 1}$$

$$= X(s)\,\frac{1/LC}{s^2 + \frac{R}{L}s + \frac{1}{LC}}$$

$$\therefore H(s) = \frac{1/LC}{s^2 + \frac{R}{L}s + \frac{1}{LC}}$$



$$\Rightarrow sQ_1(s) = X(s) - 4Q_1(s) \Rightarrow Q_1(s)(s+4) = X(s) \Rightarrow Q_1(s) = \frac{X(s)}{s+4}$$

$$\Rightarrow sQ_2(s) = Q_1(s) + X(s) - 3Q_2(s) \Rightarrow Q_2(s)(s+3) = \frac{X(s)}{s+4} + X(s)$$

$$\Rightarrow Q_2(s)(s+3) = \frac{X(s) + X(s)(s+4)}{s+4} = \frac{s+5}{s+4}X(s)$$

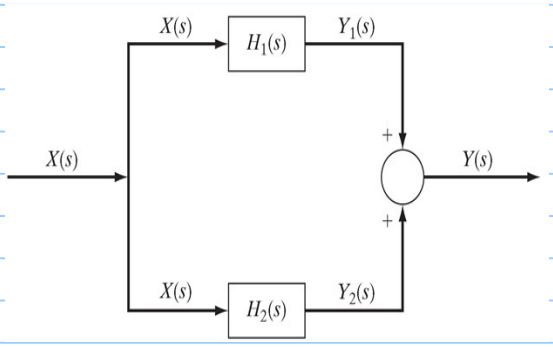
$$\Rightarrow Q_2(s) = \frac{s+5}{(s+3)(s+4)}X(s)$$

$$Y(s) = Q_2(s) + X(s) = \frac{s+5}{(s+3)(s+4)}X(s) + X(s)$$

$$= \frac{(s+5)X(s) + (s+3)(s+4)X(s)}{(s+3)(s+4)}$$

$$\therefore \quad Y(s) = \frac{s+5+(s+3)(s+4)}{(s+3)(s+4)} X(s)$$

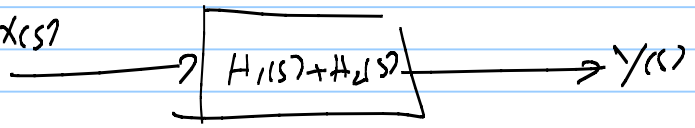
$$\therefore H(s) = \frac{s+5+(s+3)(s+4)}{(s+3)(s+4)} = \frac{s^2+8s+17}{s^2+7s+12}$$

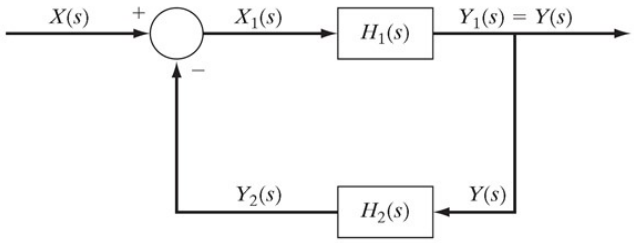


$$Y(s) = Y_1(s) + Y_2(s)$$

$$= X(s)H_1(s) + X(s)H_2(s) = (H_1(s) + H_2(s))X(s)$$

$$\frac{Y(s)}{X(s)} = H_1(s) + H_2(s)$$





$Y(s) = Y_1(s)$

$Y_2(s) = H_2(s) Y(s)$

$X_1(s) = X(s) - Y_2(s) = X(s) - H_2(s) Y(s)$

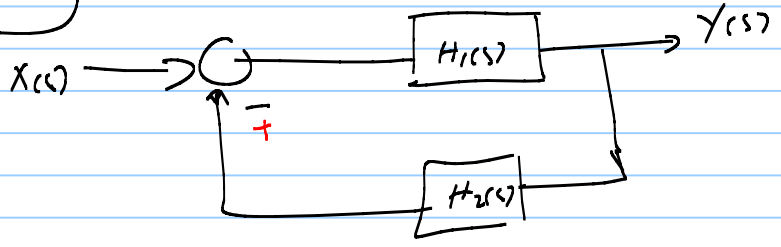
$Y(s) = Y_1(s) = X_1(s) H_1(s) = \left(X(s) - H_2(s) Y(s)\right) H_1(s)$

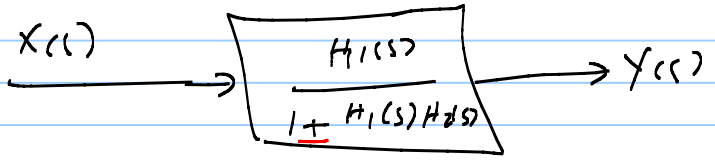
$= X(s) H_1(s) - H_1(s) H_2(s) Y(s)$

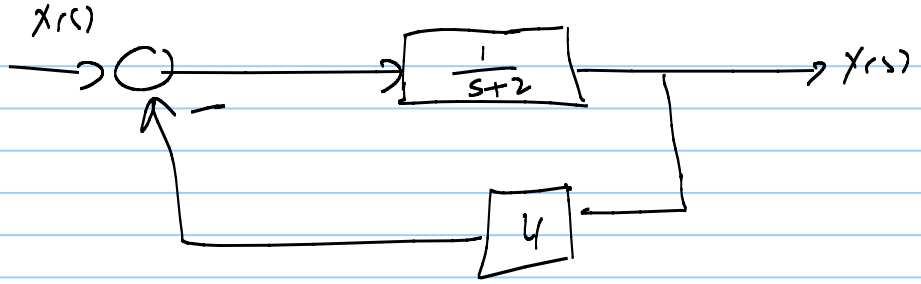
$Y(s) + H_1(s) H_2(s) Y(s) = H_1(s) X(s)$

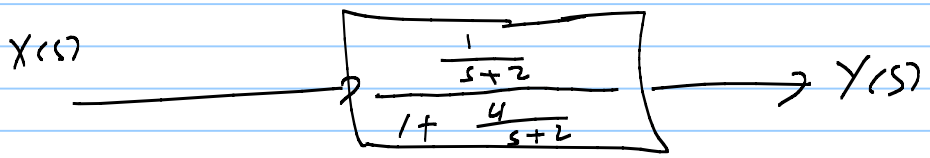
$Y(s) \left[1 + H_1(s) H_2(s)\right] = H_1(s) X(s)$

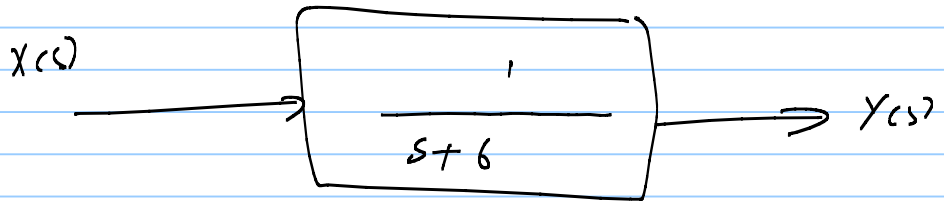
$$H(s) = \frac{H_1(s)}{1 + H_1(s) H_2(s)}$$

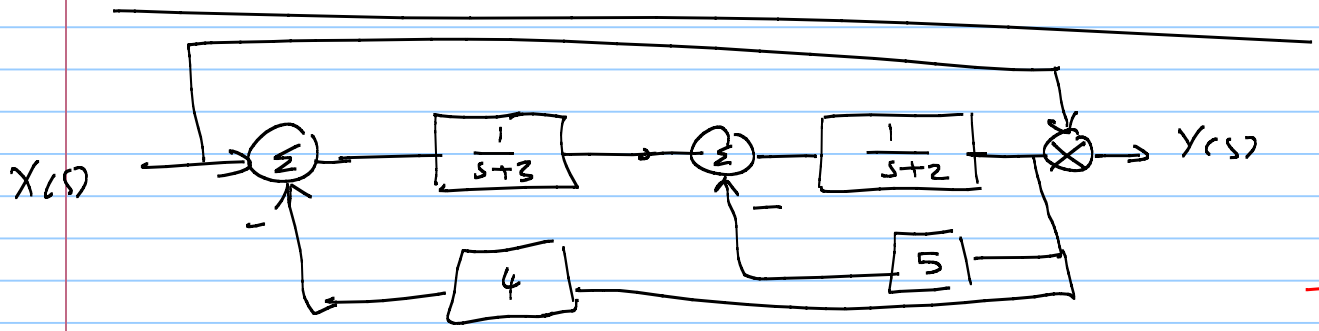


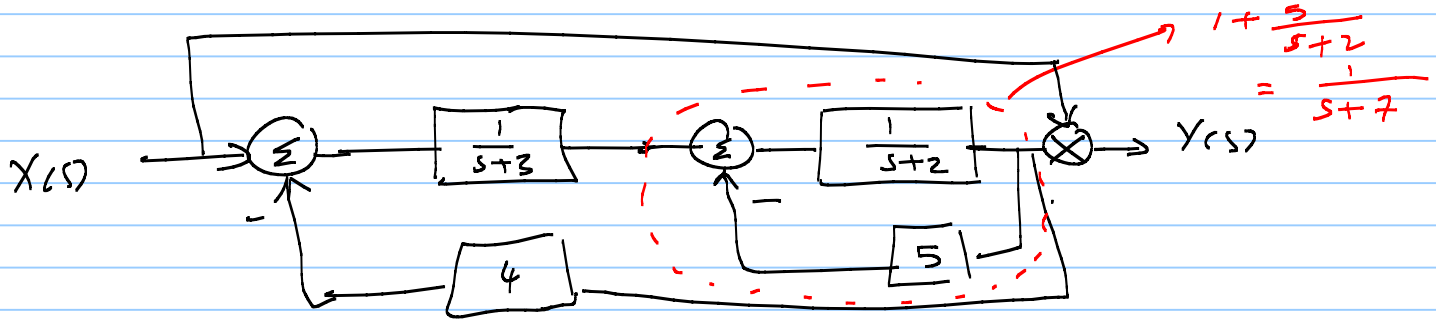


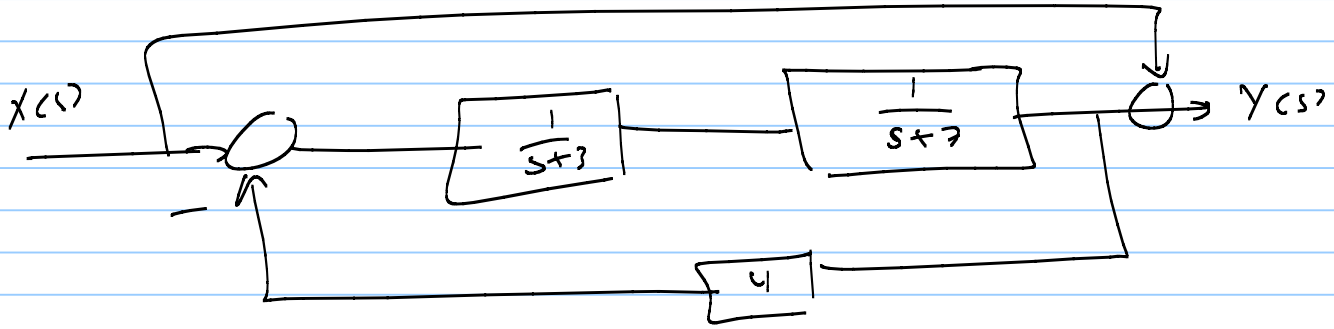

X(s)
1/(s+2)
Y(s)
4

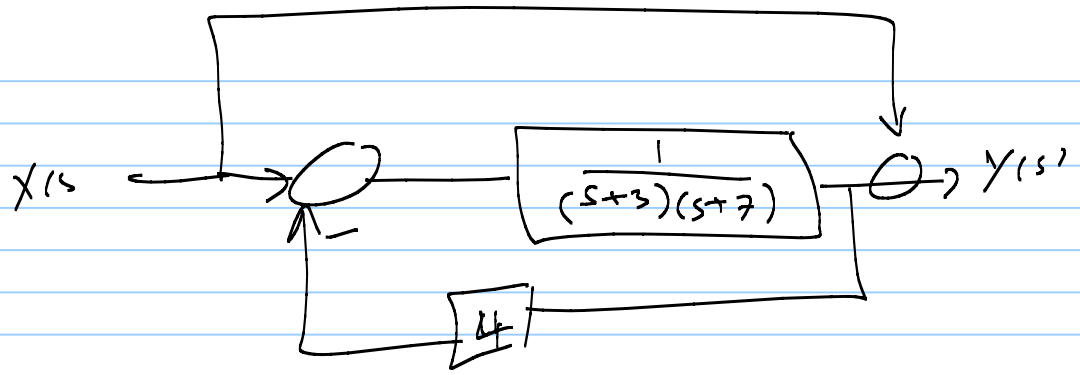

X(s)
1/(s+2)
1 + 4/(s+2)
Y(s)

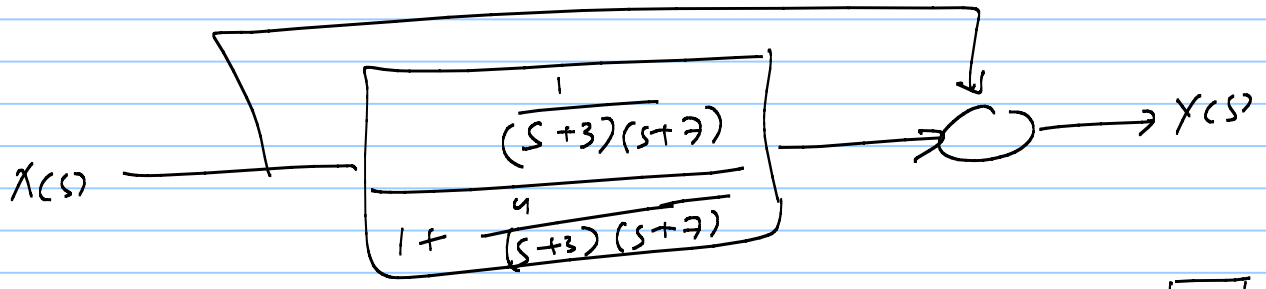

X(s)
1
s+6
Y(s)

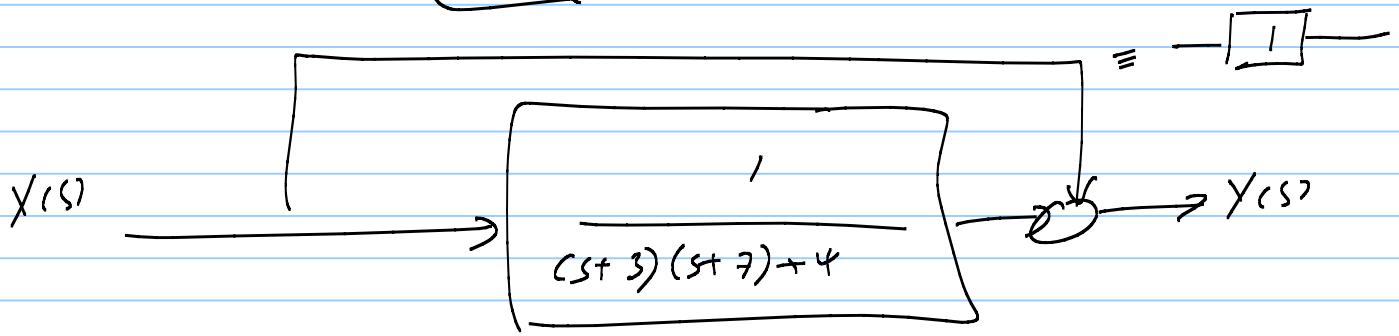

X(s)
Σ
1/(s+3)
Σ
1/(s+2)
Y(s)
4
5

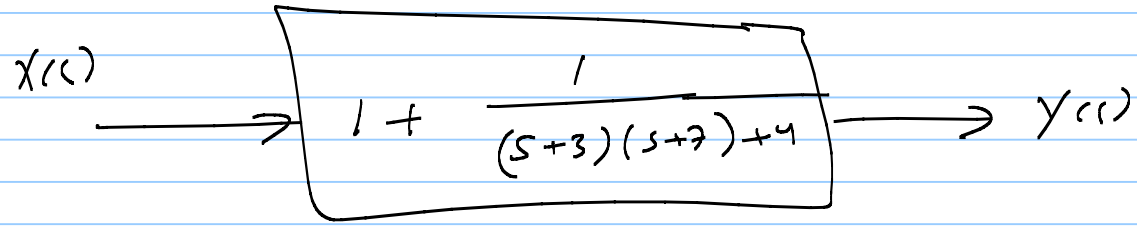

1/(s+2) / (1 + 5/(s+2)) = 1/(s+7)
X(s)
Σ
1/(s+3)
Σ
1/(s+2)
Y(s)
4
5

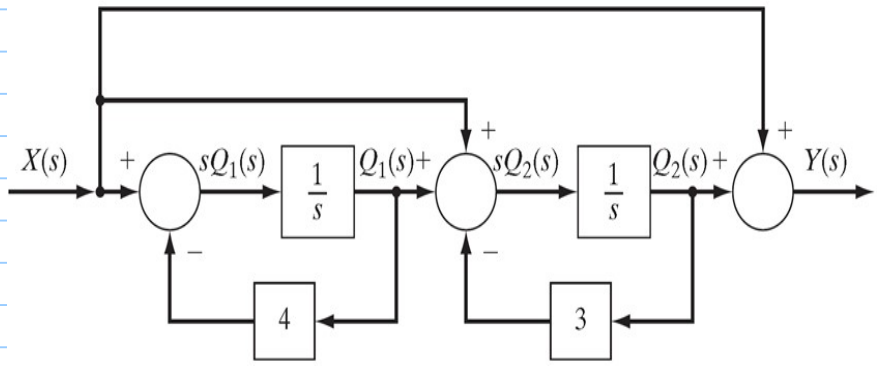

X(s)
1/(s+3)
1/(s+7)
Y(s)
4

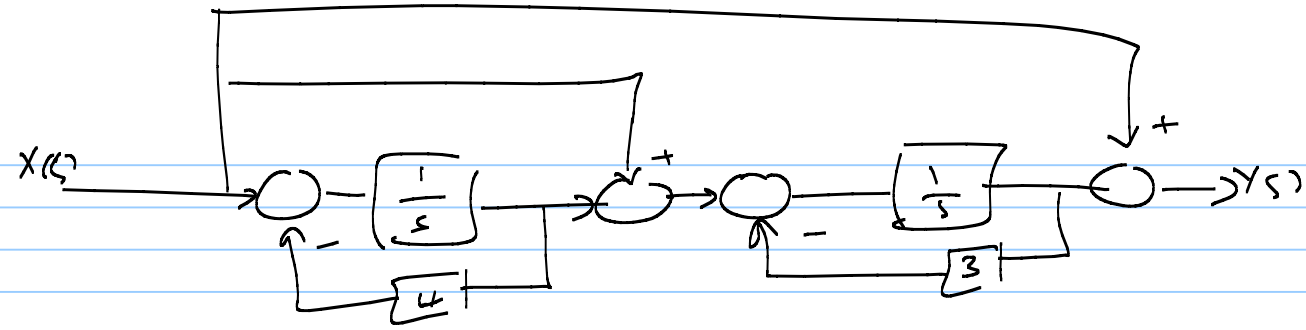

X(s)
1
(s+3)(s+7)
Y(s)
4

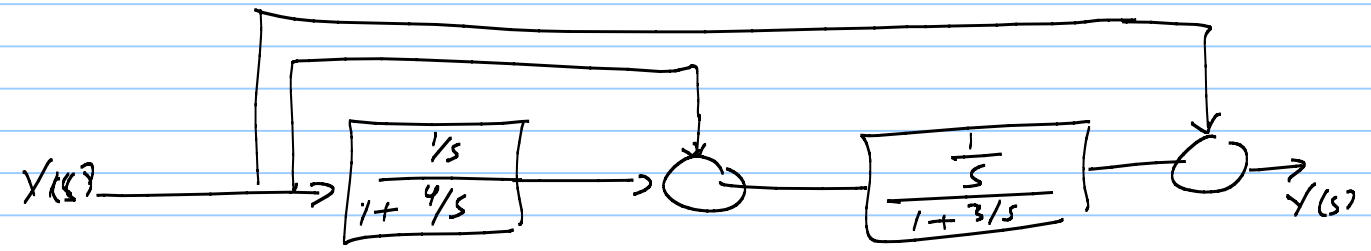

X(s)
1
(s+3)(s+7)
1 +
4
(s+3)(s+7)
Y(s)

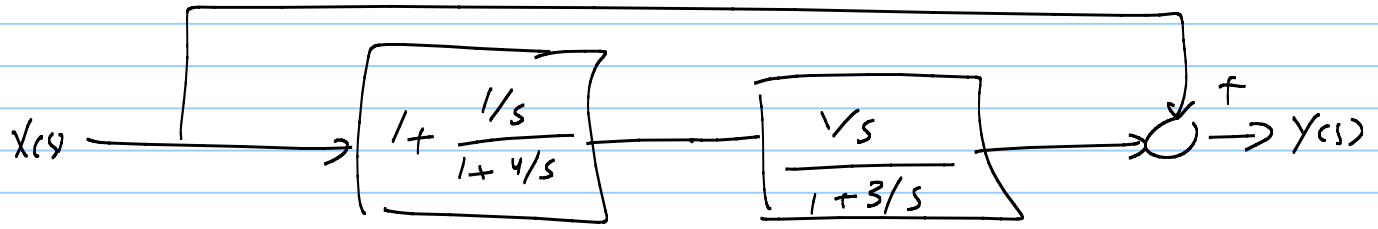

≡
1
X(s)
1
(s+3)(s+7)+4
Y(s)

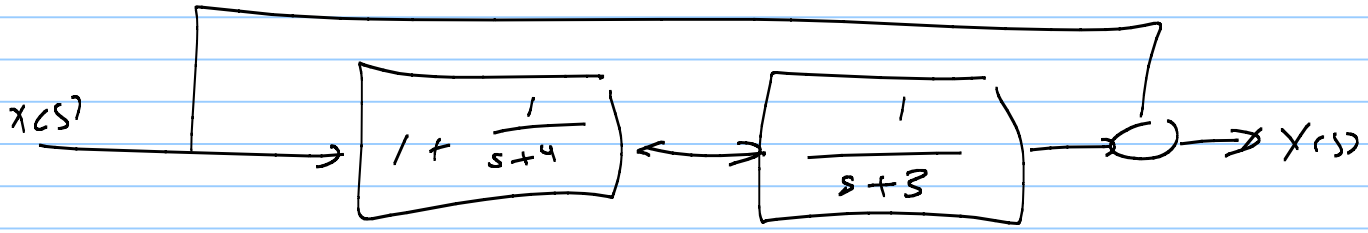

X(s)
1 +
1
(s+3)(s+7)+4
Y(s)

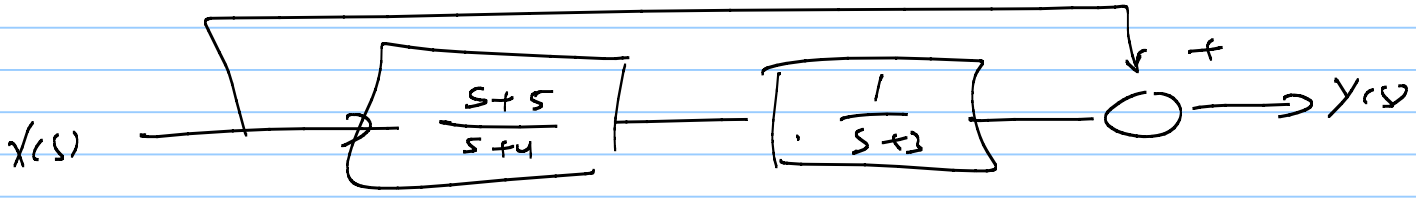

X(s)
+
sQ1(s)
1/s
Q1(s)+
+
sQ2(s)
1/s
Q2(s)+
+
Y(s)
−
4
−
3

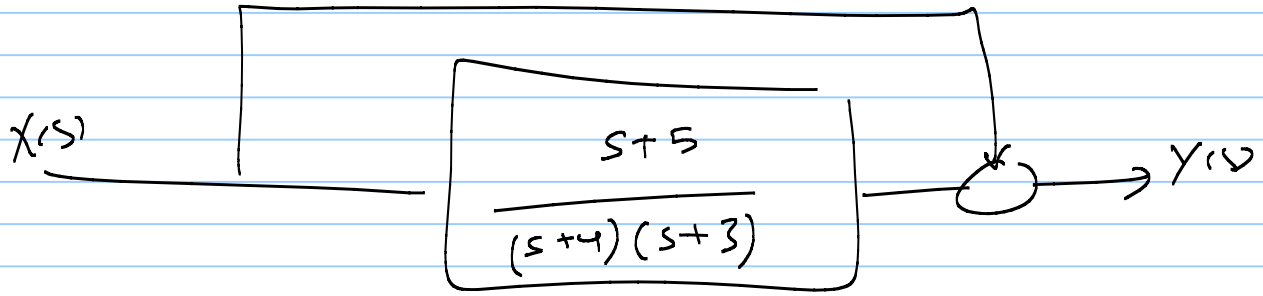

X(s)
1/s
+
+
1/s
+
Y(s)
4
3

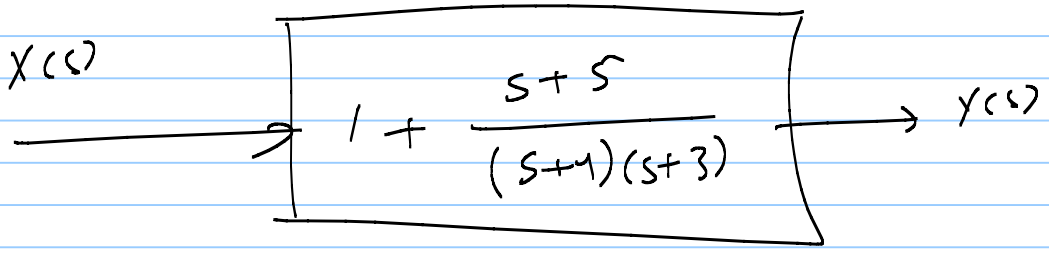

Y(s)
1/s
1+ 4/s
1/s
1+3/s
Y(s)

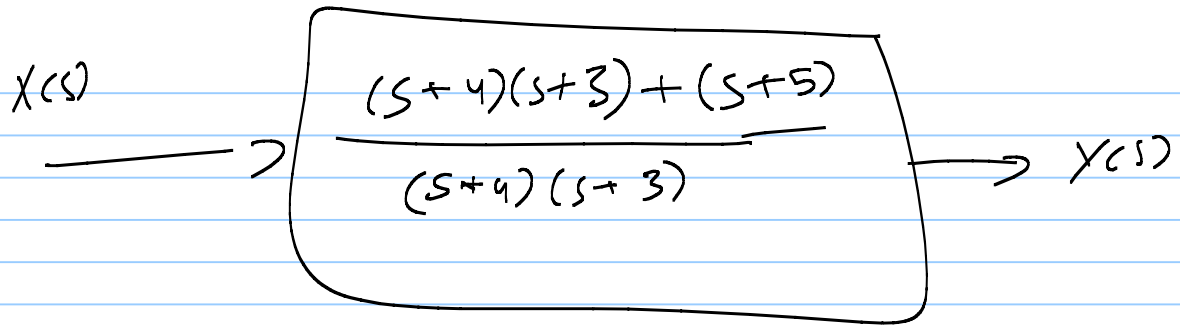

X(s)
1+ 1/s
1+ 4/s
1/s
1+3/s
+
Y(s)

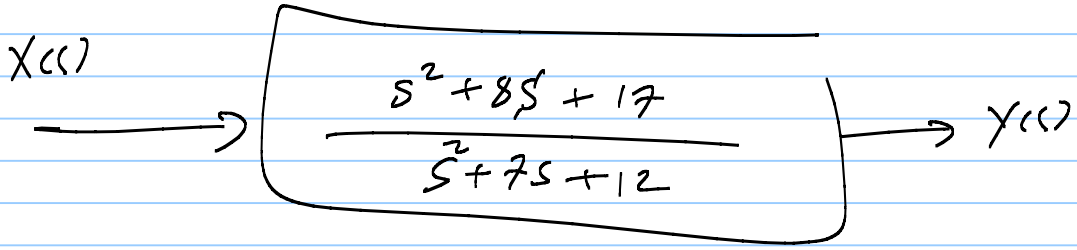

X(s)
1 + 1
s+4
1
s+3
Y(s)

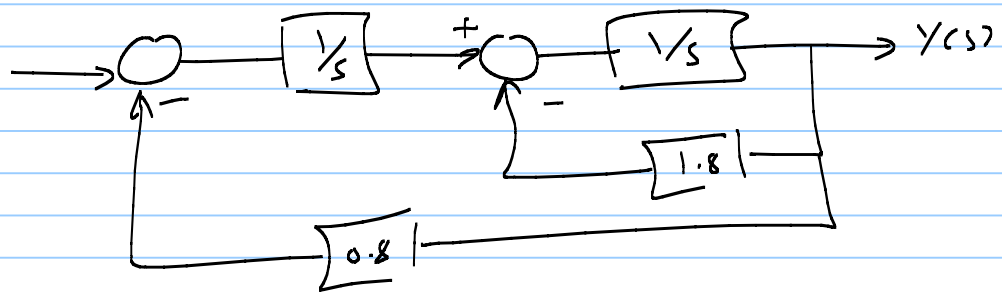

X(s)
s+5
s+4
1
s+3
+
Y(s)

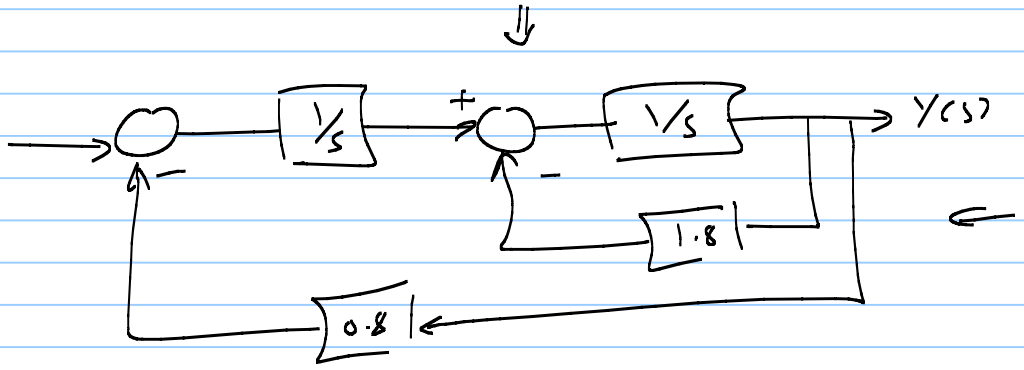

X(s)
s+5
(s+4)(s+3)
Y(s)

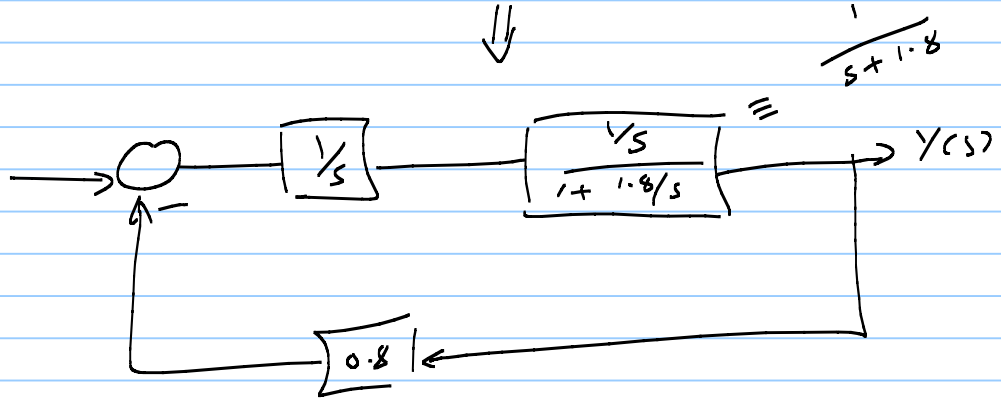

X(s)
1 +
s+5
(s+4)(s+3)
Y(s)

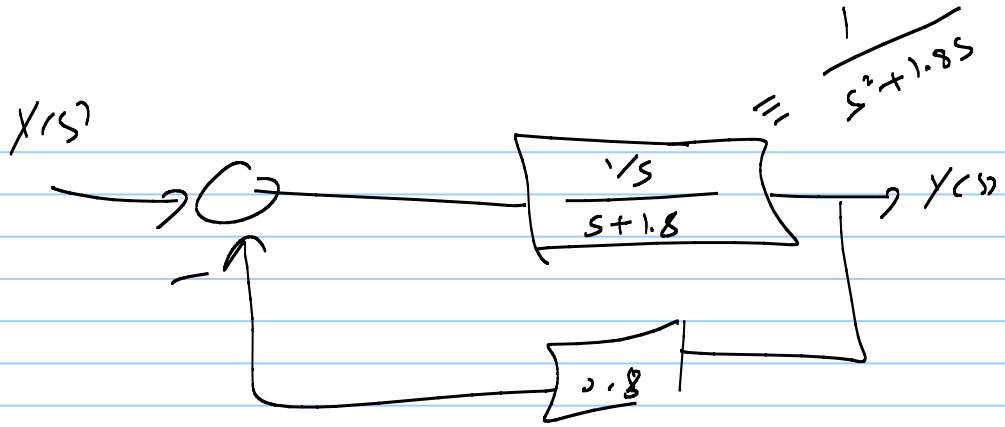

X(s)
(s+4)(s+3)+(s+5)
(s+4)(s+3)
Y(s)

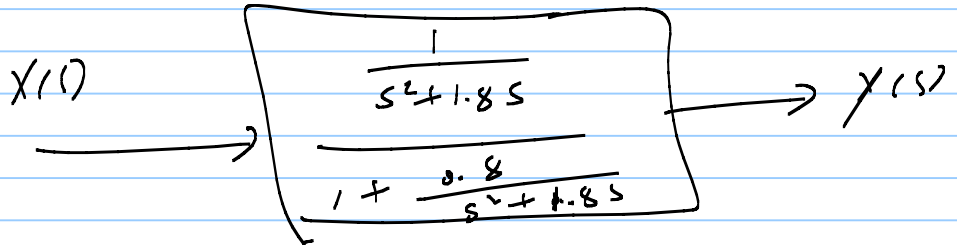

X(s)
s²+8s+17
s²+7s+12
Y(s)

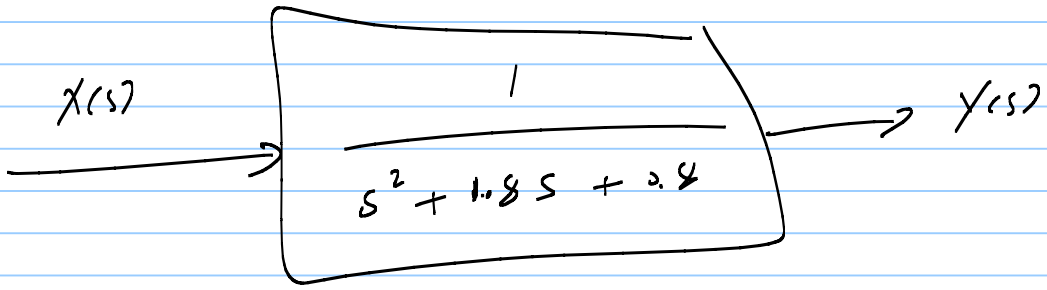

1/s
+
1/s
Y(s)
−
−
1.8
0.8


1/s
+
1/s
Y(s)
−
−
1.8
0.8


1/(s+1.8)
≡
1/s
1/s
1+1.8/s
Y(s)
−
0.8







$$H(s) = \frac{1}{s^2 + 1.8s + 0.8}$$