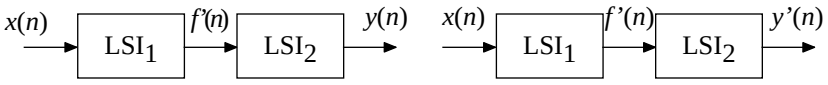
3.10The different orderings of the two cascade LSI systems are shown below.



(a) (b)

Assume that the transfer function LSI_1 is $L_1(z)$ and the transfer function of LSI_2 is $L_2(z)$. For the system in (a), the z-transform of output $y(n)$ can be calculated by

$$Y(z) = L_2(z)F(z) = L_2(z)L_1(z)X(z)$$

For the system in (b), the z-transform of output $y'(n)$ can be calculated by

$$Y'(z) = L_1(z)F'(z) = L_1(z)L_2(z)X(z).$$

Since $L_1(z)L_2(z) = L_2(z)L_1(z)$ according to the communitive law of multiplication, we can state $Y(z) = Y'(z)$, i.e. the ordering of two cascade LSI systems may be interchanged.

This can also be shown using the convolution and the LSI property of the systems.