

Example 1:

$$F(s) = \frac{4}{(s+1)(s+3)}$$

①

$$\frac{4}{(s+1)(s+3)} = \frac{A}{s+1} + \frac{B}{s+3}$$

②

$$\frac{A(s+3) + B(s+1)}{(s+1)(s+3)}$$

③

$$\frac{4}{(s+1)(s+3)} = \frac{As + 3A + Bs + B}{(s+1)(s+3)}$$

④

$$4 = As + Bs + 3A + B$$

$$s(A+B) = 0$$

$$3A + B = 4$$

⑤

$$A + B = 0$$

$$-A = B \quad \boxed{B = -2}$$

$$3A + B = 4$$

$$3A - A = 4$$

$$2A = 4$$

$$\boxed{A = 2}$$

⑥

$$\frac{A}{s+1} + \frac{B}{s+3} = \frac{2}{s+1} - \frac{2}{s+3}$$

⑦

$$2 \cdot 2^{-1} \left\{ \frac{1}{s+1} \right\} - 2 \cdot 2^{-1} \left\{ \frac{1}{s+3} \right\}$$

$$\boxed{= 2e^{-t} u(t) - 2e^{-3t} u(t)}$$