

$$\mathcal{L}^{-1} \left[ \frac{s}{(1+s^2)(1+s)^2} \right] = \mathcal{L}^{-1} \left[ \frac{\frac{1}{2}}{1+s^2} \right] - \mathcal{L}^{-1} \left[ \frac{\frac{1}{2}}{(1+s)^2} \right]$$

$$= \frac{1}{2} \sin x - \frac{1}{2} x e^{-x}. \quad (\text{الف})$$

$$\mathcal{L}^{-1} \left[ \frac{s e^{-\frac{\pi}{2}s}}{(1+s^2)(1+s)^2} \right] = \left( \frac{1}{2} \sin(x - \frac{\pi}{2}) - \frac{1}{2} (x - \frac{\pi}{2}) e^{-x + \frac{\pi}{2}} \right) u_{\frac{\pi}{2}}(x)$$

$$\left( = -\frac{1}{2} \cos x - \frac{1}{2} (x - \frac{\pi}{2}) e^{-x + \frac{\pi}{2}} \right). \quad (\text{د})$$

$$\Rightarrow y = \frac{1}{2} \mathcal{L}^{-1} \left[ \frac{s}{(1+s^2)(1+s)^2} \right] - \mathcal{L}^{-1} \left[ \frac{s e^{-\frac{\pi}{2}s}}{(1+s^2)(1+s)^2} \right]$$

(الف - د)

$$= \frac{1}{2} \sin x - \frac{1}{2} x e^{-x} + \left[ \frac{1}{2} \sin(x - \frac{\pi}{2}) + \frac{1}{2} (x - \frac{\pi}{2}) e^{-x + \frac{\pi}{2}} \right] u_{\frac{\pi}{2}}(x).$$