

$$\begin{aligned}
 6. \quad b) \quad \mathcal{F}(s) = f(x) &= \sqrt{\frac{2}{\pi}} \int_0^{\infty} f(x) \cos sx \, dx & (6) \\
 &= \sqrt{\frac{2}{\pi}} \int_0^{\infty} (a e^{-\alpha x} + b e^{-\beta x}) \cos sx \, dx \\
 &= \sqrt{\frac{2}{\pi}} \left[a \cdot \frac{\alpha}{s^2 + \alpha^2} + b \cdot \frac{\beta}{s^2 + \beta^2} \right]
 \end{aligned}$$

$$\begin{aligned}
 c) \quad a) \quad f(x) &= \frac{2}{\pi} \int_0^{\infty} \sin \lambda x \, d\lambda \int_0^{\infty} f(t) \sin \lambda t \, dt & (4) \\
 &= \frac{2}{\pi} \int_0^{\infty} \sin \lambda x \, d\lambda \int_0^{\pi} \sin t \sin \lambda t \, dt \\
 &= \frac{2}{\pi} \int_0^{\infty} \sin \lambda x \left(-\frac{1}{2} \right) \left[\frac{\sin t(1+\lambda)}{1+\lambda} - \frac{\sin t(1-\lambda)}{1-\lambda} \right]_0^{\pi} d\lambda \\
 &= \frac{2}{\pi} \int_0^{\infty} \frac{\sin \lambda x \sin \lambda \pi}{1-\lambda^2} \, d\lambda
 \end{aligned}$$

$$\begin{aligned}
 b) \quad f(x) &= \frac{2}{\pi} \int_0^{\infty} \cos \lambda x \, d\lambda \int_0^{\infty} f(t) \cos \lambda t \, dt \\
 &= \frac{2}{\pi} \int_0^{\infty} \cos \lambda x \int_0^{\infty} e^{-s} \cos s \cos \lambda t \, dt \, d\lambda \\
 &= \frac{1}{\pi} \int_0^{\infty} \cos \lambda x \frac{\lambda^2 + 2}{\lambda^4 + 4} \, d\lambda.
 \end{aligned}$$

_____ x _____