

**國立台灣海洋大學河海工程學系工程數學(二) 2B 班第三次小考
參考解答**

$$1. \int_0^{\infty} \int_y^{\infty} f(x, y) dx dy = \int_a^d \int_b^c f(x, y) dy dx \quad (1)$$

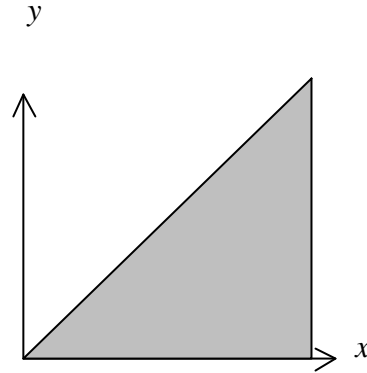
Please determine a, b, c and d and plot the domain of integration on x - y plane. (50%)

$$a=0,$$

$$b=0,$$

$$c=x,$$

$$d=\infty$$



2. Determine $\sin(t) * \sin(t)$, where “*” means convolution. (50%)

解

$$\begin{aligned} & \sin(t) * \sin(t) \\ &= \int_0^t \sin(t) \sin(t - \tau) d\tau \\ &= \frac{1}{2} \int_0^t [\cos(2\tau - t) - \cos(t)] d\tau \\ &= \frac{1}{2} \left[\frac{\sin(2\tau - t)}{2} - \tau \cos(t) \right] \Big|_0^t \\ &= \frac{1}{2} [\sin(t) - t \cos(t)] \end{aligned}$$