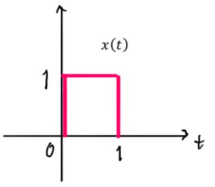
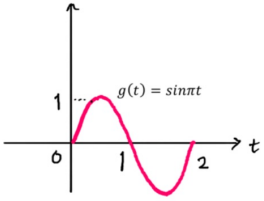
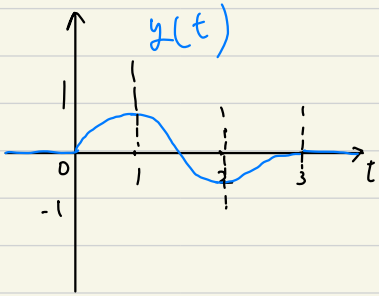
課題5　1/16　　52122305　岩崎純弥

課題5-1

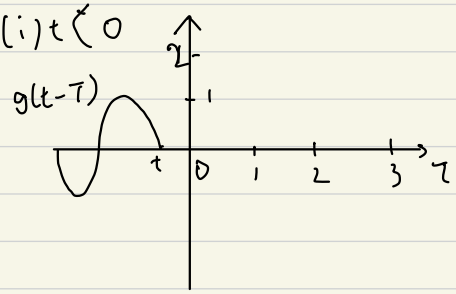
- $x(t)$と$g(t)$が以下の図のように与えられたとき，畳み込み積分である$y(t) = x(t) * g(t)$を計算して，図示せよ．結果は，tの値ごとの図も同時に示すこと．





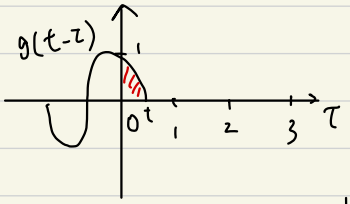


(i) $t < 0$



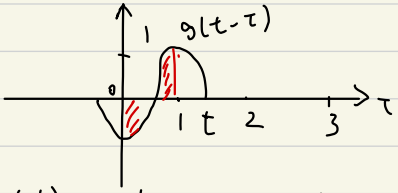
$$y(t) = \int_{-\infty}^{\infty} x(\tau) g(t-\tau)\, d\tau = 0$$

(ii) $0 \leqq t < 1$



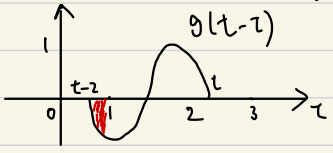
$$y(t) = \int_0^t \sin\pi(t-\tau)\, d\tau = -\frac{1}{\pi}\left[-\cos\pi(t-\tau)\right]_0^t = \frac{1}{\pi}(1-\cos\pi t)$$

(iii) $1 \leqq t < 2$



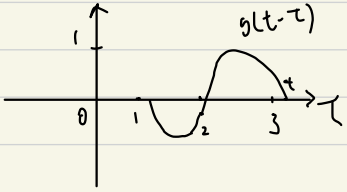
$$y(t) = \int_0^1 \sin\pi(t-\tau)\, d\tau = -\frac{1}{\pi}\left[-\cos\pi(t-\tau)\right]_0^1 = \frac{1}{\pi}(\cos\pi(t-1) - \cos\pi t)$$

(iv) $2 \leqq t < 3$



$$y(t) = \int_{t-2}^1 \sin\pi(t-\tau)\, d\tau = -\frac{1}{\pi}\left[-\cos\pi(t-\tau)\right]_{t-2}^1 = \frac{1}{\pi}(\cos\pi(t-1) - 1)$$

(v) $t \geqq 3$



$$y(t) = \int_{-\infty}^{\infty} x(\tau) g(t-\tau)\, d\tau = 0$$