EE103 Quiz 5 November 6, 2017

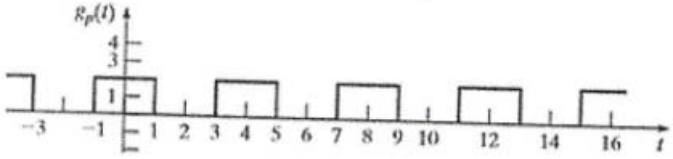
NAME_____ ID_____

This quiz is to review

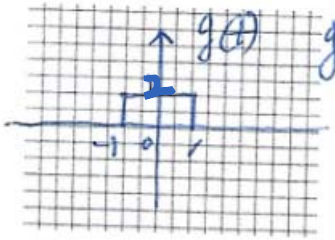
(a) how to represent a periodic signal by using mathematical convolution of a generating function g(t) and an impulse train function $\delta_T(t)= \sum_{k=-\infty}^{k=+\infty} \delta(t-kT)$.

(b) to find Fourier Transform of g(t), G(ω).

Consider the periodic function $g_P(t)$ below



(1) (5 pts) draw g(t) below and also determine the value of T.



generating function

$g(t) = rect(t/2)$

$T = 4$

(2) (5 pts) find G(ω), Fourier Transform (FT) of g(t).

$$G(\omega) = \int_{-\infty}^{\infty} g(t)\, e^{-j\omega t}\, dt = \int_{-1}^{1} 2\, e^{-j\omega t}\, dt$$

$$= 2\,\frac{e^{-j\omega} - e^{-j\omega(-1)}}{-j\omega} = 2\,\frac{e^{+j\omega} - e^{-j\omega}}{j\omega} = 2\,\frac{e^{+j\omega} - e^{-j\omega}}{2j\omega}\,2$$

$$= 4\,\frac{\sin\omega}{\omega} = 4\,\mathrm{sinc}\,\omega$$