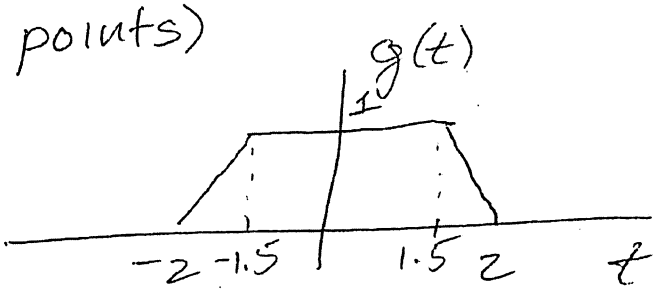
ECE 312 HW #1 Solution

Turn in not later than Noon on July 5th. Be sure to have it timestamped

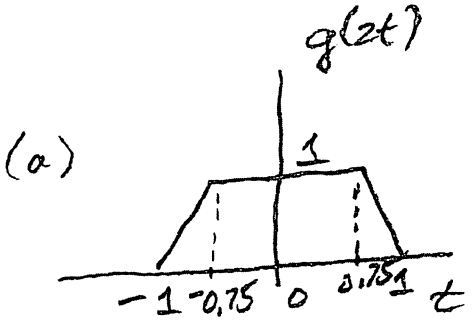
(1) (3 points)

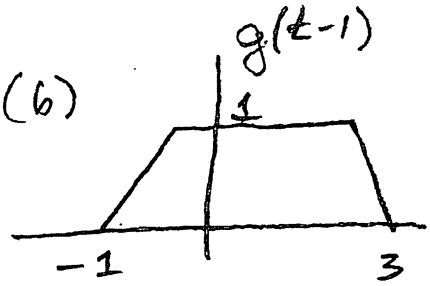


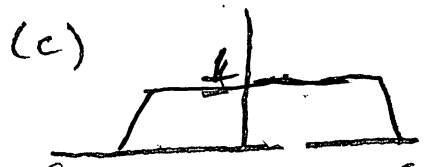
(a) plot $g(2t)$

(b) plot $g(t-1)$

(c) plot $g\left(\frac{t-2}{4}\right)$







(2) use the Euler identities to prove (2 points)

$\sin(x)$ is the anti-derivative of $\cos(x)$

(3) (2 points) let $x(t) = e^{j\omega_0 t}$; $\omega_0 \neq 0$

find the fundamental period

(4) (3 points) let $x(t) = t\,u(t)$

is this signal an energy signal, a power signal or neither? (justify)

(2) $$\sin(x) = \frac{e^{jx} - e^{-jx}}{2j}$$

$$\frac{d\sin(x)}{dx} = \frac{je^{jx} + je^{-jx}}{2j}$$

$$= \frac{e^{jx} + e^{-jx}}{2} = \cos x$$

(3) $$x(t) = e^{j\omega_0 t}$$

if this has period T then

$$x(t+T) = e^{j\omega_0(t+T)} = e^{j\omega_0 t}$$

$$= e^{j\omega_0 t} \underbrace{e^{j\omega_0 T}}_{\text{must} = 1}$$

then $\omega_0 T = n 2\pi \quad (n \in I)$

or $T = \frac{n 2\pi}{\omega_0}$

fundamental period is where $n = 1$

$\therefore$ $T = \frac{2\pi}{\omega_0}$ is the fundamental period

(4) neither

it is not band limited

$\therefore \quad E \to \infty$

it has no period

$\therefore \quad P \to \infty$