

# Signals and Linear Systems

## Additional Practice Problem Set #2

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1. For each signal, determine if it is periodic, and if it is, find the fundamental period:

(a)  $x(t) = 2 \cos(2.1 \pi)$

(b)  $x(t) = e^{j2.4t} + 2 e^{j3.6t}$

(c)  $x(t) = \cos(5 t^2)$

(d)  $x(t) = 2 \cos(2\pi t + \pi/3) + 3 \sin(3\pi t - 1)$

(e)  $x(t) = e^{j2.4t} u(t)$

2. Categorize each of the following signals as a finite energy signal or a finite power signal, and find the energy or time-averaged power of the signal:

(a)  $x(t) = e^{(-j 2t)}$

(b)  $x(t) = (u(t+1) - u(t-1)) \cos(t)$

(c)  $x(t) = 2 \cos(1.2 t - \pi/6)$

(d)  $x(t) = e^{(-t)} u(t)$

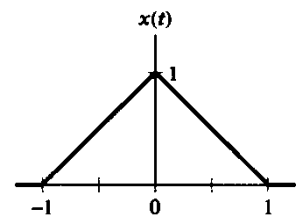
(e)  $x(t) = e^{j 2.4t}$

(f)  $x(t) = r(t)$  (ramp signal)

(g)  $x(t) = 10^6 [u(t-1) - u(t-10^9)]$

(h)  $x(t) = u(t) \cos(t)$

(i)  $x(t)$  shown in the figure to the right



3. Categorize each of the following signals as a finite energy signal or a finite power signal, and find the energy or time-averaged power of the signal:

(a)  $x(t) = \begin{cases} t, & 0 \leq t \leq 1 \\ 2 - t, & 1 \leq t \leq 2 \\ 0, & \text{otherwise} \end{cases}$

(b)  $x[n] = \begin{cases} n, & 0 \leq n < 5 \\ 10 - n, & 5 \leq n \leq 10 \\ 0, & \text{otherwise} \end{cases}$  (Replace  $n$  by  $t$  in this part)

(c)  $x(t) = 5 \cos(\pi t) + \sin(5\pi t), -\infty < t < \infty$

(d)  $x(t) = \begin{cases} 5 \cos(\pi t), & -1 \leq t \leq 1 \\ 0, & \text{otherwise} \end{cases}$

(e)  $x(t) = \begin{cases} 5 \cos(\pi t), & -0.5 \leq t \leq 0.5 \\ 0, & \text{otherwise} \end{cases}$