Homework 2

Problem 1

Plot the following signal x(t) given by :

$$x(t) = \begin{cases} 2 \ for \ 0 \le t < 2 \\ 4 \ for \ 2 \le t \le 4 \\ 0 \ elsewhere \end{cases}$$

Generate and plot:

$$x(-2t) \ and \ x[-2(t-1)]$$

Problem 2

Plot the following signal y(t) given by:

$$y(t) = \begin{cases} 10sin\left(\frac{\pi}{4}t\right) \ for - 4 \le t \le 4 \\ 0 \ elsewhere \end{cases}$$

Generate and plot:

$$y\left[-\frac{(t+2)}{2}\right] \ and \ y\left[-\frac{(t-2)}{2}\right]$$

Problem 3

Generate plots for each of the following waveforms for the time span from -5s to 5s

a) $x_1(t)$ = -6u(t+3)
b) $x_2(t)$ = 4u(t+2)-4u(t-2)
c) $x_3(t)$ =-2u(t+2)+2u(t+4)
d) $x_4(t)$ = 5r(t+2)-5r(t)
e) $x_5(t)$ = 10 − 5(r+2) + 5r(t)

Problem 4

For the following functions, indicate if it exhibits even symmetry, odd symmetry, or neither one.

a) $x_1(t) = 3t^2 + 4t^4$
b) $x_2(t) = 3t^3$
c) $x_3(t) = 4[sin(3t) + cos(3t)]$
d) $x_4(t) = \frac{sin(4t)}{4t}$

Problem 5:

Determine if each of the following signals is a power signal, an energy signal, or neither.

a) $x_1(t) = 3[u(t+2)-u(t-2)]$

b) $x_2(t) = 2[r(t)-r(t-2)]$

c) $x_3(t) = e^{-2t}u(t)$

d) $x_4(t) = [t\cos(3t)]u(t)$

e) $x_5(t) = 2\sin(4t)\cos(4t)$

Problem 6:

Compute the energy of the following signals:

a) $x_1(t) = e^{-at}u(t)\,for\;a > 0$

b) $x_2(t) = e^{-a|t|}\,for\;a > 0$

Problem 7

Compute the average power of the following signals:

a) $x_1(t) = 2\cos(5t)$

b) $x_2(t) = 2u(-t) + 2u(t)$ (this is like a DC voltage of 2V)