1) For the shown signal $x_1(t)$,

a) Find the energy and the power of the signal. (3 points)

$$E = \lim_{T \to \infty} \frac{1}{T} \int_{-T}^{T} |x(t)|^2 dt$$

or area under square of the curve

$$= \int_{-2}^{2} x^2(t) dt$$

The graph shows:

$$E = 36(2) + 9(2) = 72 + 18 = 90$$

$$P = \frac{E}{T}$$

$P = 0$ because $(-\infty < t < \infty)$. It is energy signal because $E$ is finite.

b) Is it a power signal or energy signal? Justify your answer. (1 point)

2) Express the signal shown in terms of singularity functions (3 points)

$$x_2(t) = 3u(t+4) + \frac{3}{2} \delta(t+2) - 3 \delta(t) + \frac{3}{2} \delta(t-2)$$

$$- 3u(t-4)$$

Note: $\frac{3}{2}$ is the slope.

Other solutions are also possible.

Note that $\frac{1}{2} \delta(t) = \delta(\frac{t}{2})$ "this not true for other functions in general."

3) Sketch the single sided spectra (amplitude & phase) of the following signal:

$$x_3(t) = 4 + 2 \cos(20\pi t + \pi/4) + \sin(24\pi t/6)$$

$$= 4 + 2 \cos(2\pi t + \frac{\pi}{4}) + \sin(2\pi t - \frac{\pi}{4})$$

$\omega_4 = \frac{\pi}{4}$}

Plan to learn and learn to plan

Good Luck, Dr. Ali Muqaibel