Serial # 0

**-1 points for not writing your serial number**

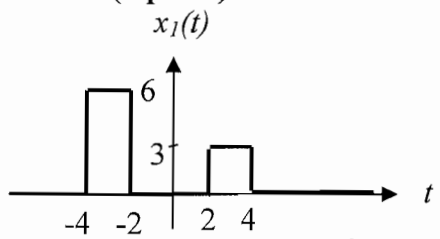
**King Fahd University of Petroleum & Minerals**
Electrical Engineering Department
EE207: Signals and Systems (081)
**Quiz 1**: Signal and System Modeling Concepts

Name: KEY ver. 1

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

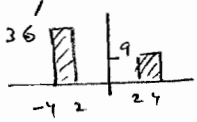
a) Find the energy and the power of the signal. **(3 points)**

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



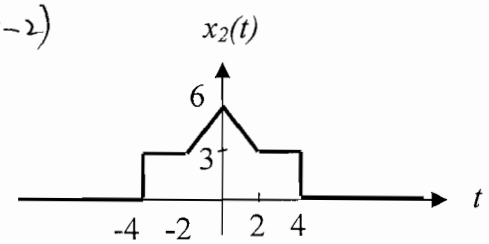

$E = \lim_{T\to\infty} \int_{-T}^{T} |x(t)|^2 dt$ or area under square of the curve

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




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

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




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

note $\frac{3}{2}$ is the slope

other solutions are also possible

note that $\frac{1}{2} r(t) = r\left(\frac{t}{2}\right)$ "this not true for other functions in general!"

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

$x_3(t) = 4 + 2\cos(20\pi t + \pi/4) + \sin(24\pi t + \pi/6)$ **(3 points)**

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

$= 4 + 2\cos(2\pi(10)t + \pi/4) + \cos(2\pi(12)t - \frac{2}{3}\pi)$