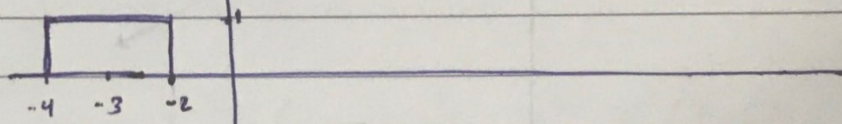
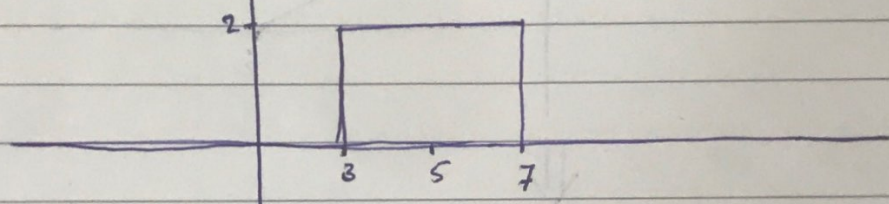


Exc 1 : a) $x_a(t) = 2\pi \left(\frac{5-t}{4} \right) + \pi \left(\frac{t+3}{2} \right) - r \left(\frac{t-12}{2} \right) + 2u(t-16)$
 $= \pi \left(\frac{t+3}{2} \right) + 2\pi \left(\frac{-1}{4} (t-5) \right) - r \left(\frac{1}{2} (t-12) \right) + 2u(t-16)$

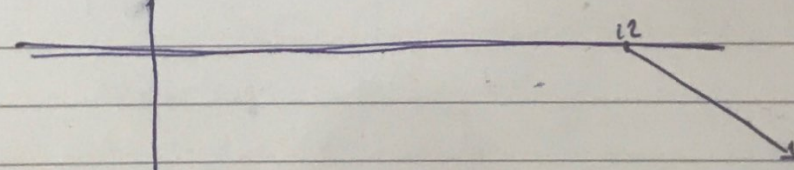
$\pi \left(\frac{1}{2} (t+3) \right)$



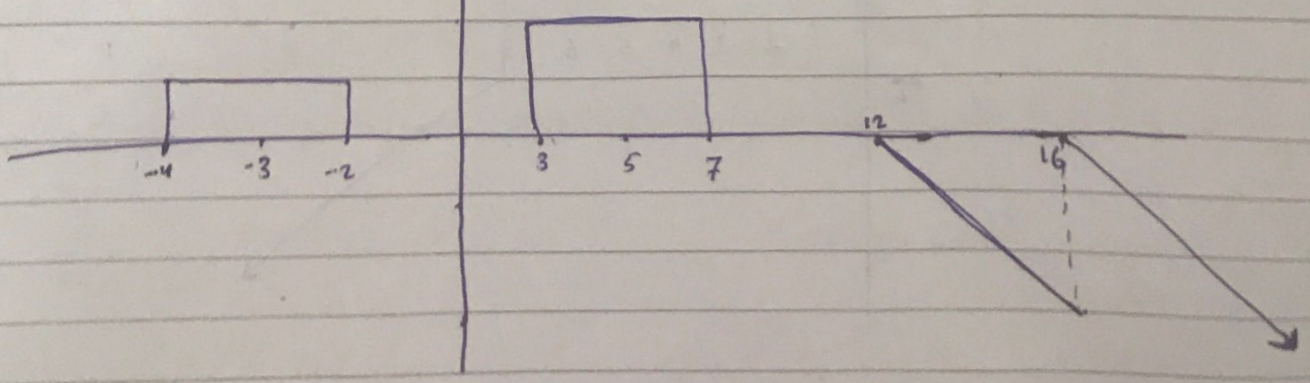
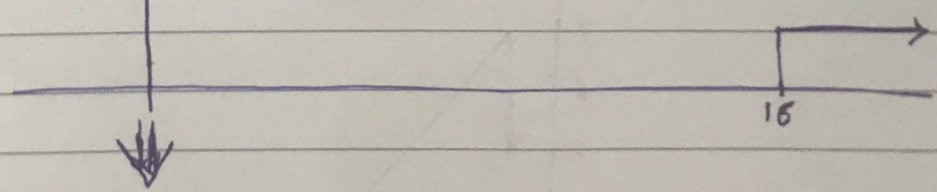
$2\pi \left(\frac{-1}{4} (t-5) \right)$



$-r \left(\frac{1}{2} (t-12) \right)$

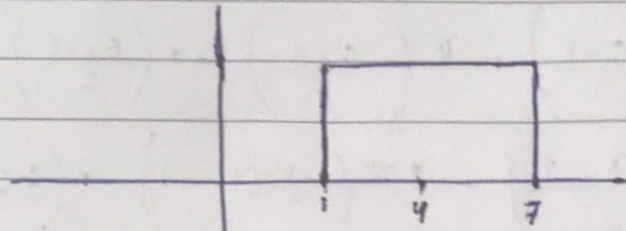


$2u(t-16)$

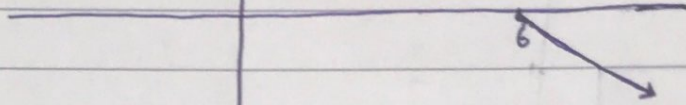


$$x_b(t) = 2\pi \left(\frac{t-4}{6} \right) - r \left(\frac{t-6}{2} \right) + r(-t+6)$$

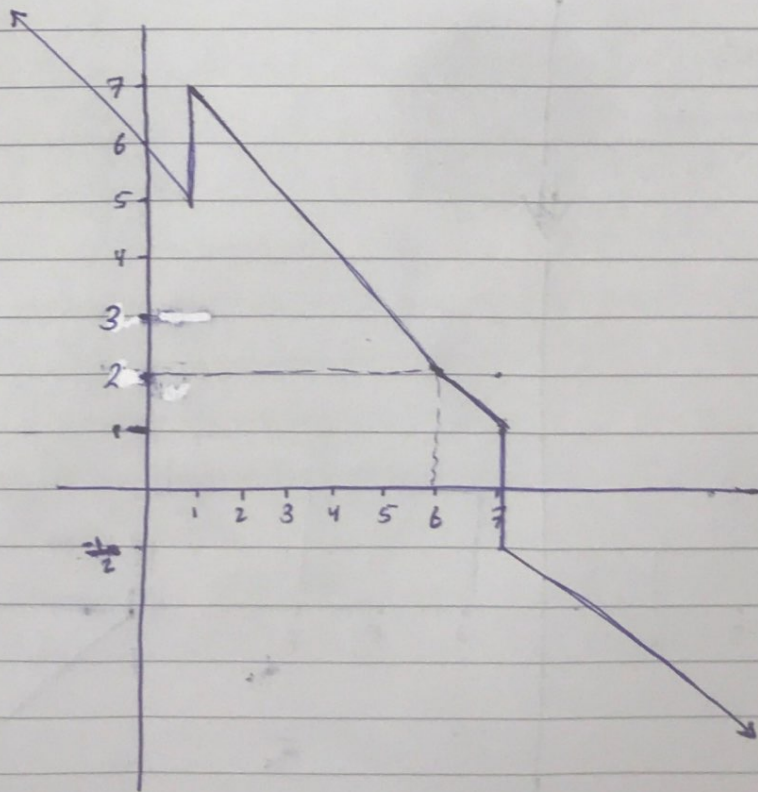
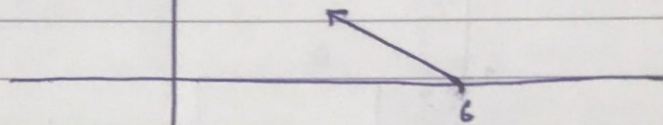
$$2\pi \left(\frac{1}{6}(t-4) \right)$$



$$-r \left(\frac{1}{2}(t-6) \right)$$



$$r(-t+6)$$



Exc 2: $\int_{-\infty}^{\infty} x(t) \delta(t - \frac{\pi}{2}) dt = (-1) \frac{dX(t)}{dt} = (-1) \dot{x}(t) \Big|_{t=\frac{\pi}{2}}$

$$= -1 \left[20 \sin(\pi t + \frac{\pi}{2}) \cdot \cos(\pi t + \frac{\pi}{2}) \cdot \pi \right] \Big|_{t=\frac{\pi}{2}}$$

$$= -20\pi \left[\sin\left(\frac{\pi^2}{2} + \frac{\pi}{2}\right) \cdot \cos\left(\frac{\pi^2}{2} + \frac{\pi}{2}\right) \right]$$

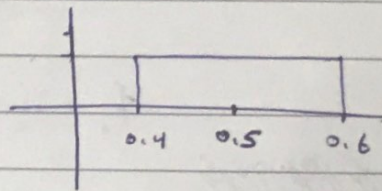
$$= -18.51145821$$

$$\approx -18.5$$

Exc 3 $y(t) = 5 \sin(10\pi t) \cdot \Pi(s(t-0.5)) + 4e^{2t} \cdot \Pi\left(\frac{t-5}{4}\right)$

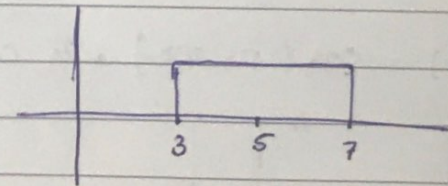
$\Pi(s(t-0.5))$

center = 0.5
 $\frac{1}{2\alpha} = \frac{1}{10}$



$\Pi\left(\frac{1}{4}(t-5)\right)$

center = 5
 $\frac{1}{2\alpha} = \frac{1}{2 \cdot \frac{1}{4}} = 2$



$E = \lim_{T \rightarrow \infty} \int_{-T}^T [y(t)]^2 dt$

$= \lim_{T \rightarrow \infty} \int_{0.4}^{0.6} [5 \sin(10\pi t)]^2 dt + \int_3^7 [4e^{2t}]^2 dt$

$= \lim_{T \rightarrow \infty} \left[\int_{0.4}^{0.6} 25 \sin^2(10\pi t) dt + \int_3^7 16e^{4t} dt \right]$

$= \lim_{T \rightarrow \infty} \left[25 \left(\frac{1}{2} - \frac{1}{2} \cos(20\pi t) \right) \Big|_{0.4}^{0.6} + \frac{16}{4} e^{4t} \Big|_3^7 \right]$

$= \lim_{T \rightarrow \infty} \left[25 \left(\frac{1}{2} - \frac{1}{2} \cos(20\pi \cdot 0.6) - \left(\frac{1}{2} - \frac{1}{2} \cos(20\pi \cdot 0.4) \right) \right) + \left[4e^{28} - 4e^{12} \right] \right]$

$= \lim_{T \rightarrow \infty} \left[(7.3 - 4.9) \right] + \left[5.785 \cdot 10^{12} \right]$

$= 2.46 + 5.785 \cdot 10^{12}$

$$\beta = \lim_{t \rightarrow \infty} \frac{1}{2T} \int_{-T}^T x(t) dt = \lim_{t \rightarrow \infty} \frac{2.46 + 5.785 \times 10^{12}}{2T} = 0$$

∴ Energy

Exc 4: $x(t) = \cos(50\pi t) + 20 \sin(19t)$

a) $f_1 \Rightarrow 2\pi f_1 = 50\pi$

$$f_1 = 25$$

$f_2 \Rightarrow 2\pi f_2 = 19$

$$f_2 = \frac{19}{2\pi}$$

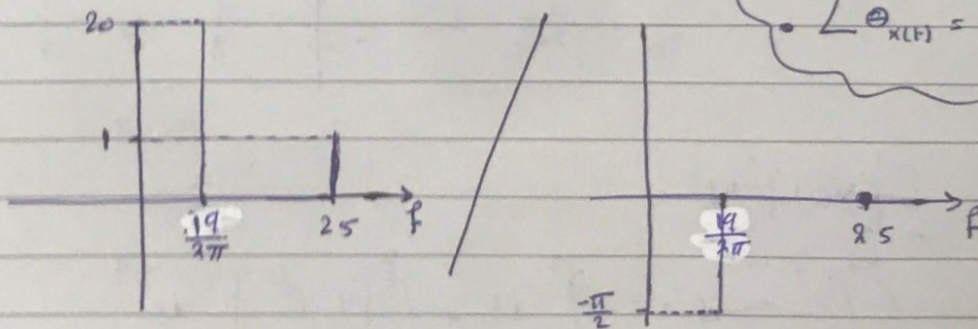
f_2 irrational number \rightarrow not periodic

~~not periodic~~

b) $x(t) = \cos(50\pi t) + 20 \cos(19t - \frac{\pi}{2})$

• $|x(t)| = |x(-t)|$
 • $\angle_{x(f)} = -\angle_{x(-f)}$

single:



double:

