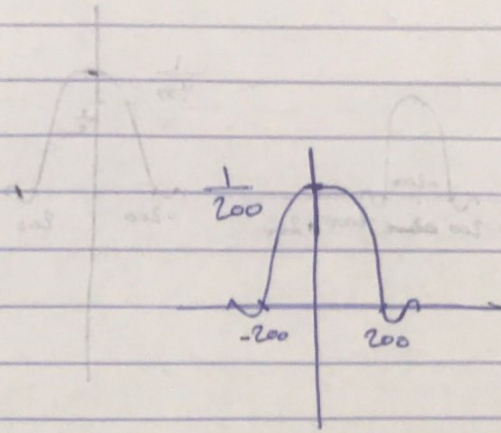


$$1] m(t) = \Pi(200t)$$

$$L[m(t)] = L[\Pi(200t)]$$

~~$$m(f) = \frac{1}{200} \text{sinc}(200f)$$~~

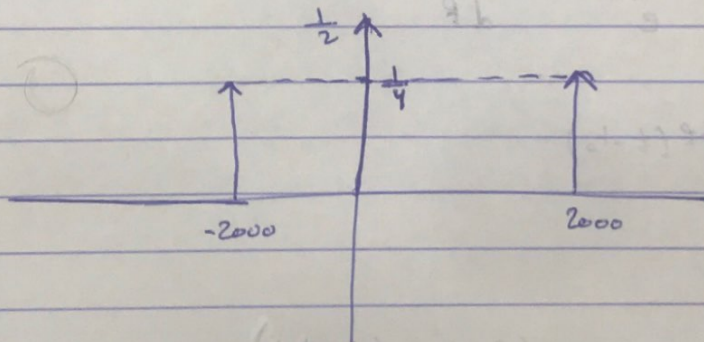
$$m(f) = \frac{1}{200} \text{sinc}\left(\frac{f}{200}\right)$$



~~$$c(t) = \cos^2(2000\pi t)$$~~

$$= \frac{1}{2} + \frac{1}{2} \cos(4000\pi t)$$

$$C(f) = \frac{1}{2} \delta(f) + \frac{1}{4} [\delta(f-2000) + \delta(f+2000)]$$



$$2] s(t) = m(t) * c(t)$$

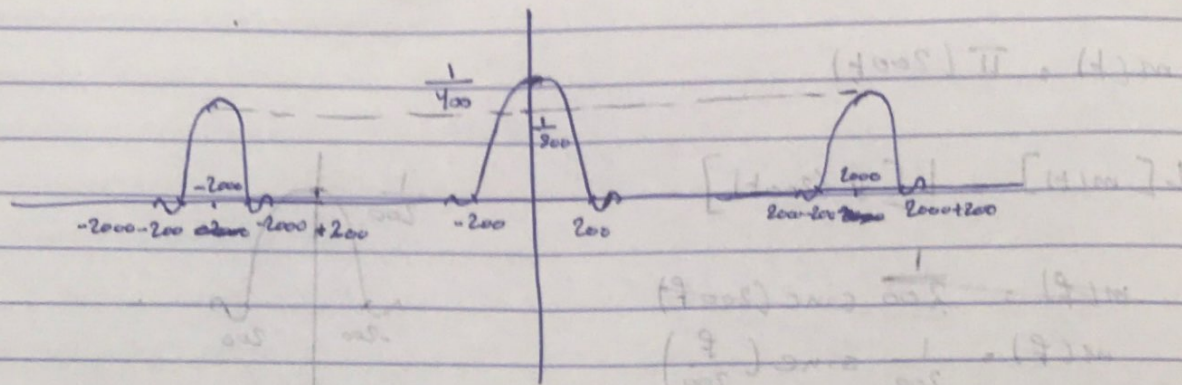
~~step 1~~

~~$$s(t) = \frac{1}{200} \text{sinc}\left(\frac{f}{200}\right) *$$~~

$$s(t) = \Pi(200t) * \left[\frac{1}{2} + \frac{1}{2} \cos(4000\pi t) \right]$$

$$s(t) = \frac{\Pi(200t)}{2} + \frac{\Pi(200t)}{2} \cos(4000\pi t)$$

$$S(f) = \frac{1}{400} \text{sinc}\left(\frac{f}{200}\right) + \frac{1}{800} \left[\text{sinc}\left(\frac{f-2000}{200}\right) + \text{sinc}\left(\frac{f+2000}{200}\right) \right]$$



3] use Low pass filter because $m(t)$ in the origin

$$h_{LP}(t) = \int_{-\infty}^{\infty} H_{LP}(f) e^{j2\pi ft} df$$

$$= \int_{-200}^{200} \frac{1}{400} e^{-j2\pi ft_0} e^{j2\pi ft} df$$

$$= \int_{-200}^{200} \frac{1}{400} e^{j2\pi f(t-t_0)} df$$

$$= \frac{2 \times 200 \times \frac{1}{400}}{1} \text{sinc}(2 \times 200(t-t_0))$$

$$h_{LP}(t) = \text{sinc}(400(t-t_0))$$