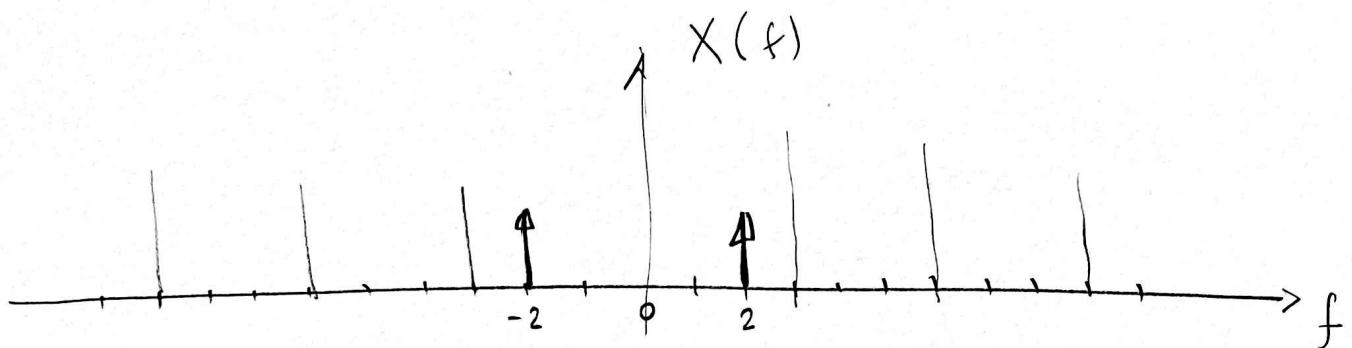
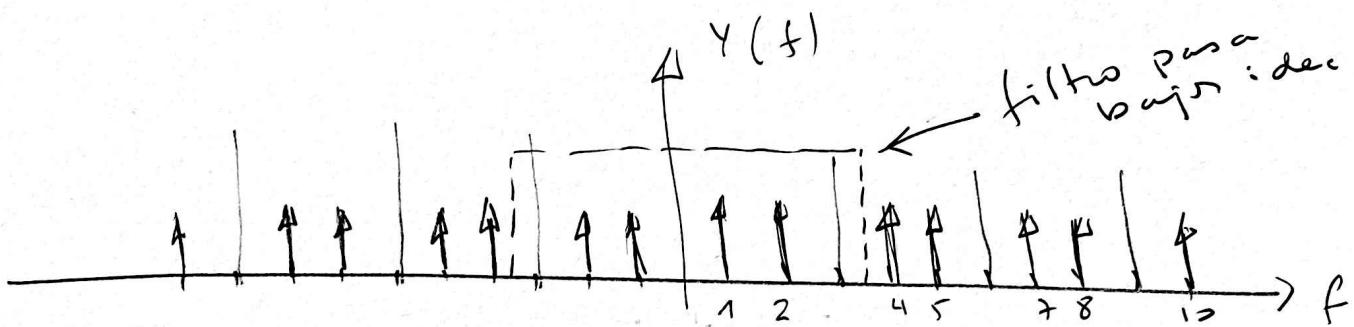


B1)

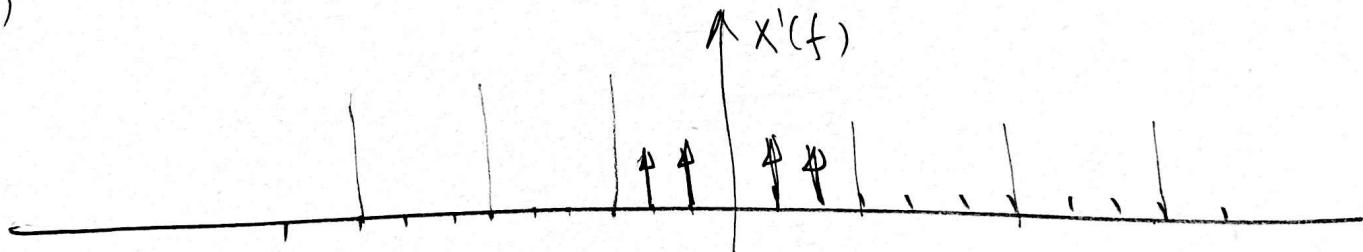
a)



b)



c)



d) $x'(t)$ es la suma de dos sinusoides una de 1kHz , la otra de 2kHz .

B2)
2)

$$N = M - n + 1 = 256 - 7 + 1 = 250$$

$$Q = P = 256$$

b)

A hand-drawn diagram of a rectangular tank. The width is labeled at the bottom as 250. The height is labeled on the left as $\frac{1}{7}$. The depth is labeled on the right as 250. Inside the tank, there are two circles representing bubbles, one near the bottom center and one near the top center. A bracket at the top indicates a height of 250 from the base to the top of the water level. A bracket at the bottom indicates a width of 250 from the front edge to the back edge.

$$c) \quad V(f) = \lambda \|Hf - g\|^2 + \|Wf\|^2 \rightarrow \min$$

$$\frac{\partial V}{\partial I} = 2xH^T(H + g) + 2w^Tw = 0$$

$$\lambda^H H^T f - \lambda^H g + w^T w f = 0$$

$$(\lambda H^T H + w^T w) f = \lambda H^T g$$

$$\hat{f} = \lambda [\lambda H^T H + w^T w]^{-1} H^T g = \hat{f} = \Delta g$$

$$d) \quad \min_{f_n} \phi \cdot \|f_n - g\|^2 \rightarrow \min \quad f_n = \begin{bmatrix} 1 & 1 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \end{bmatrix} f = Pf$$

$$= \| Pf - Hf \|^2 = \| (P - H)f \|^2 \rightarrow \min$$

$$W = P - H = \begin{bmatrix} 1 & \dots & 0 & 0 \\ \vdots & \ddots & \vdots & 0 \\ 0 & \dots & 1 & 0 \\ 0 & \dots & 0 & 1 \end{bmatrix} - \frac{1}{2} \begin{bmatrix} 1 & \dots & 1 & 1 \\ \vdots & \ddots & \vdots & \vdots \\ 1 & \dots & 1 & 1 \\ 1 & \dots & 1 & 1 \end{bmatrix}$$

B2 cont)

a) ... $w = P - H$

$$\hat{f} = \lambda \underbrace{[I - H^T H + (P - H)^T (P - H)]^{-1}}_A H^T g$$

c) $\boxed{\hat{F} = \Delta G}$

B3

Ya =

0	0	0	0	0	0
0	1.0000	1.0000	1.0000	1.0000	0
0	2.0000	2.0000	2.0000	2.0000	0
0	3.0000	3.0000	3.0000	3.0000	0
0	0	0	0	0	0

Yb =

0	0	0	0	0	0
0	-1.0000	-1.0000	-1.0000	-1.0000	0
0	1.0000	1.0000	1.0000	1.0000	0
0	0	0	0	0	0
0	0	0	0	0	0

Yc =

0	0	0	0	0	0
0	0	0	0	0	0
0	3	3	3	3	0
0	3	3	3	3	0
0	0	0	0	0	0

Yd =

0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Ye =

0	0	0	0	0	0
-3	-3	-3	-3	-3	-3
-3	-3	-3	-3	-3	-3
0	0	0	0	0	0
0	0	0	0	0	0

Yf =

0	1	2	3	4	5
0	1	2	3	4	5
0	1	2	3	4	5
0	1	2	3	4	5
0	1	2	3	4	5

B4

Xa =

0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Xb =

0	0	0	0	0	0
0	1	1	1	0	0
0	1	1	1	1	0
0	1	1	1	1	0
0	0	1	1	1	0

Xc =

0	0	0	0	0	0
0	0	0	0	0	0
0	0	1	0	0	0
0	0	0	1	0	0
0	0	0	0	0	0

Xd =

0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0