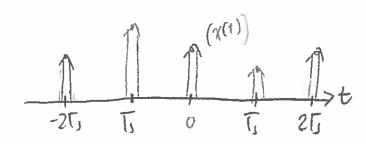
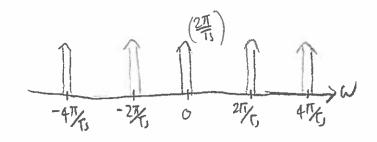
Dennis Chen PSO8

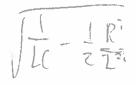
la. Sketch Mp(t) (sampled original signal)



b. Sketch PCW)



C. Sketch XpCW)

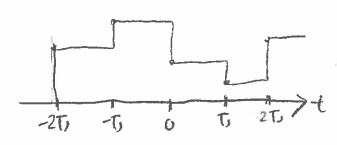


27/25 - CON CONTROLL 27/25 41/2 WM 27/25 41/2

d. Wm ST to keep all information.

e. To recover X(t) from Xp(t), bandpass Xp(t) b/w - Wm & Wm, & than scale by of to get X(t).

g. given 8(+), sketch Xz(t) = Xp * Z(t)

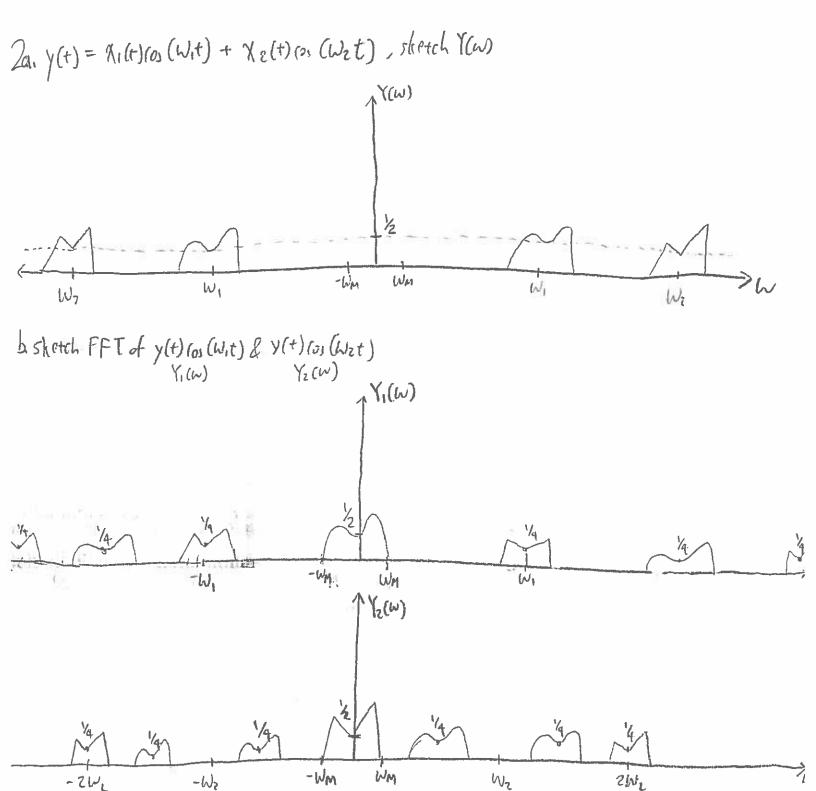


hold lost sampled velve until the next one

- (01 (-UT) - 15in (-WT h. Skotch Xz(W) Z(+)= | when OStSTI Z(w) = JZ(+)e-jwldt (-16-6)= (05(-WTs)+jsin(-W. O other De Cio=100 + ish C = Ste-intle $= \left[\frac{e^{-j\omega t}}{-j\omega}\right]^{2} = \frac{e^{-j\omega t_{5}}}{-j\omega} - \frac{1}{-j\omega}$ $\chi(t-t_0) \rightarrow e^{-j\omega t_0} \chi(\omega)$ $\chi(t-t_0) \rightarrow e^{-j\omega t_0} \chi(\omega)$ $\chi(t-t_0) \rightarrow e^{-j\omega t_0} \chi(\omega)$ Z (w) = e-iwts . Ts sinc (wts) > this is of form Aeio w/ amplitude of phase $X_{s(w)} = X_{p(w)}X(w)$ 12(w) 1 Xx(v) Tohous of Xs(w) 2T/T, -27行 47/ 初了 -21/5

i. Sketch Xcw) = Xxcw) Hcw) & X(w) = Xpcw) Hcw) 1 X(w) j. How are XCW & XCW) differet? X(w) & X(w) have different amplitudes, & X(w) was multiplied by a part of a sinc, so it is not a scaled version of the original, its fleguencies decrease move quickly when you go from 0 to WM as compared to $\hat{X}(\omega)$. Another way of saying that is that it has a different envelope. k. What is the ratio of X(Wm) to X(Wm) when Wm=干?? $Z(\frac{\pi}{2}) = \overline{I}_{5} \operatorname{sinc}(\frac{\pi}{2}) \rightarrow \overline{I}_{5} \cdot \frac{\sin(\frac{\pi}{2})}{I} = \overline{I}_{5} \cdot \frac{2}{\pi} = \frac{2\overline{I}_{5}}{\pi}$

The ratio is $\frac{2T_s}{T}$, since you get X(w) effectively by multiphying 2(w) by Xp(w) of filtering b/w we b - We.



C. To recover M(t) from y(t), multiply y(t) by cos(Wit), lowpass filter w/a cutoff at Wm, & multiply the amplitude of the signal by 2. To recover X2(t), repeat the same process but multiply by cos(Wzt) instead.

$$i(t) = \left(\frac{d}{dt} \, V_{out}(t)\right)$$

$$V_{L}(t) = L \, \frac{d}{dt} \, i(t) = \left(L \, \frac{d^{2}}{dt^{2}} \, V_{out}(t)\right)$$

$$V_{R}(t) = R \, i(t) = R \left(\frac{d}{dt} \, V_{out}(t)\right)$$

a. Write a differ relating Vont of Vin.

$$V_{in}(t) = V_R(t) + V_L(t) + V_{out}(t)$$

b. Find frequency response EI (w) of the system.

$$\frac{V_{in}(\nu) = V_{out}(\nu)}{V_{in}(\nu)} = \frac{1}{j \, \nu R(+j^2 \nu^2 L(+1))} = \frac{1}{j \, \nu R(-\nu^2 L(+1))} \frac{(1-\nu^2 L(-1))^2 + \nu^2 R^2 C^2}{(1-\nu^2 L(-1))^2 + \nu^2 R^2 C^2}$$

(. Find
$$|H(\omega)|$$

 $|H(\omega)| = \frac{1}{|W(C+1-W^2LC)|} = \sqrt{\frac{1}{W(RC)^2 + (1-W^2LC)^2}}$

$$(1-w^2LC)^2 = 1-2w^2LC + w^4(LC)^2$$

d. Maximize /HICW)

Minimize
$$w^2(RC)^2 + (1-w^2LC)^2 \rightarrow w^2(RC)^3 + 1 - 2w^2LC + w^4(LC)^2$$

when is derivative $w^4(LC)^2 - 2w^2LC + w^2(RC)^2 + 1$
 $w^4(LC)^2w^3 - 4L(w + 2(RC)^2w = 0)$

$$W\left[4(LC)^{2}n^{2}-4L(+2(RC)^{2})\right]=0$$

3d continued.
$$w \left[4L^2C^2w^2 - 4L(+2RC)^2 \right] = 0$$

$$w^2 = \frac{4LC - 2RC)^2}{4(LC)^2} = \frac{4LC}{4(LC)^2} - \frac{2R^2C^2}{4L^2C^2}$$

$$w^2 = \frac{1}{LC} - \frac{R^2}{2L^2}$$

$$w = \frac{1}{LC} - \frac{R^2}{2L^2}$$
to maximize $|H(w)|$

$$W = \pm \sqrt{\frac{1}{LC} - \frac{R^2}{2L^2}}$$
 to maximize $|H(w)|$

