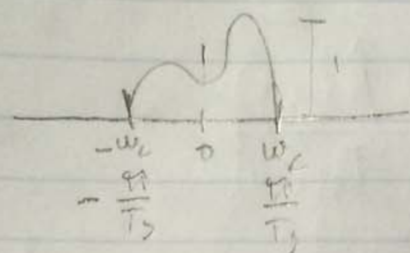
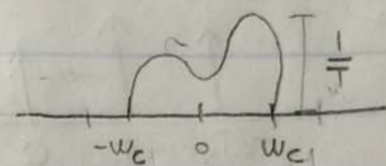
(I) $\bar{X}(\omega) = X_2(\omega)H(\omega)$ $\hat{X}(\omega) = X_p(\omega)H(\omega)$



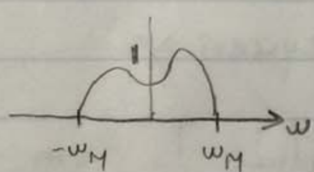


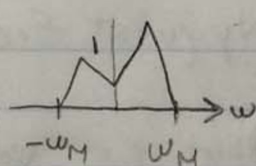
(j) $\bar{X}(\omega)$ has an amplitude of 1 while $\hat{X}(\omega)$ has an amplitude of $\frac{1}{T}$.
It also happens that the zerohold approximation will not be an identical copy.

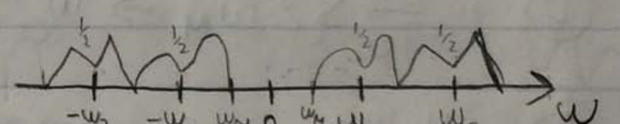
(k) $\frac{\bar{X}(\omega_M)}{\hat{X}(\omega_M)} = 1$

(2) $X_1(\omega)$ $X_2(\omega)$ $Y(\omega) = x_1(t)\cos(\omega_1 t) + x_2(t)\cos(\omega_2 t)$

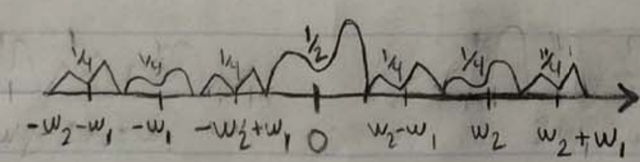
(A)

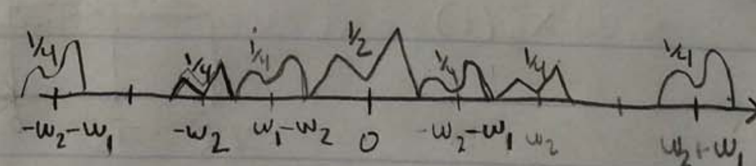






(B) $\mathcal{F}\{y(t)\cos(\omega_1 t)\}$ $\mathcal{F}\{y(t)\cos(\omega_2 t)\}$





(C) We sample at a high enough frequency ($>2\omega_c$) that we pick up the signal completely. We then apply an ideal low pass filter with amplitude 2. This filter has a frequency spectrum between $-\omega_M$ and ω_M. depending on which one we want to pickup we multiply $y(t)$ by either $\cos(\omega_1 t)$ or $\cos(\omega_2 t)$ respectively and apply the filter.