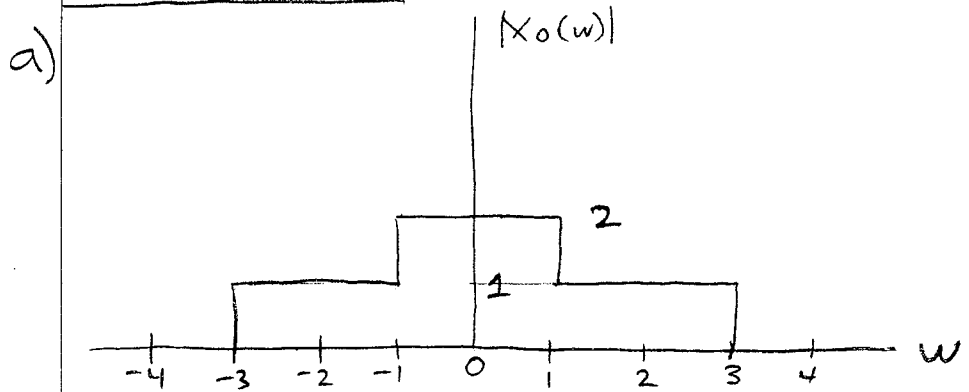
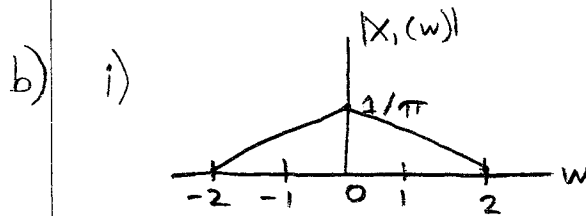


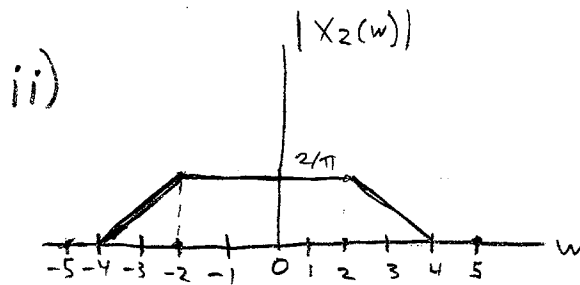
Problem 1



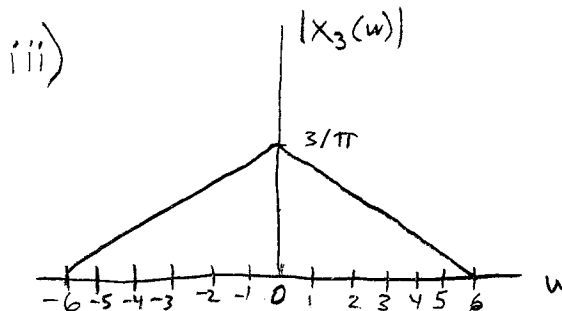
Justification: F.T. Table, Linearity
 → Just summed the two F.T.'s,



Used multiplication property,

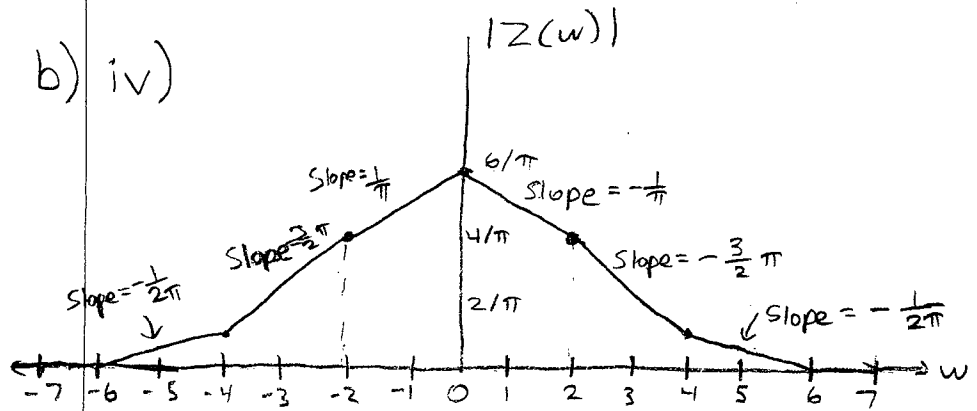


Used multiplication property,



Used multiplication property,

b) iv)



→ Summed the above plots.

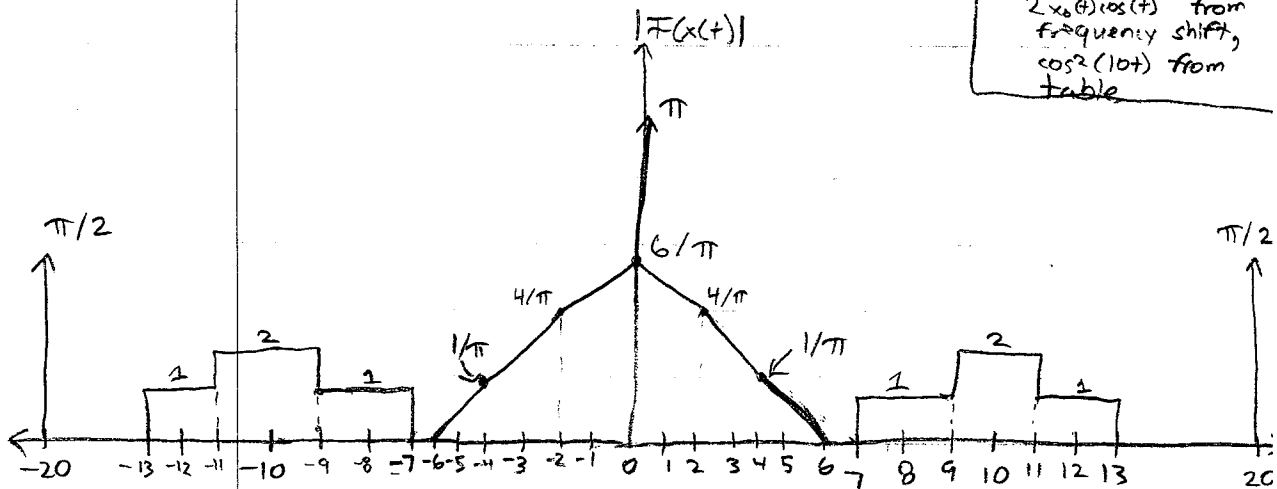
* My drawing skills are not very good;
I have indicated the slopes above.

Problem 2

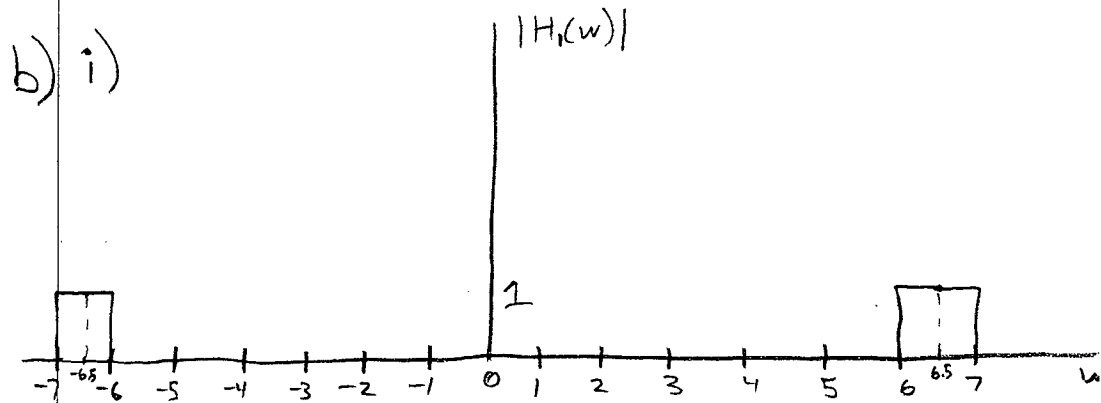
$$\begin{aligned} \text{a) } x(t) &= (x_0(t))^2 + 2x_0(t)\cos(10t) + \cos^2(10t) \\ &= x_0(t)^2 + 2x_0(t)\cos(10t) + \frac{1}{2} + \frac{1}{2}\cos(20t) \end{aligned}$$

Using linearity, $\mathcal{F}(x(t)) =$

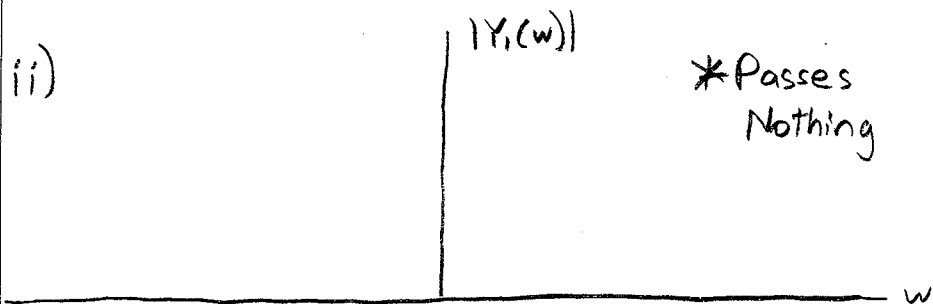
Justification:
 $x_0(t)$ from part:
 $2x_0(t)\cos(t)$ from
 frequency shift,
 $\cos^2(10t)$ from
 table



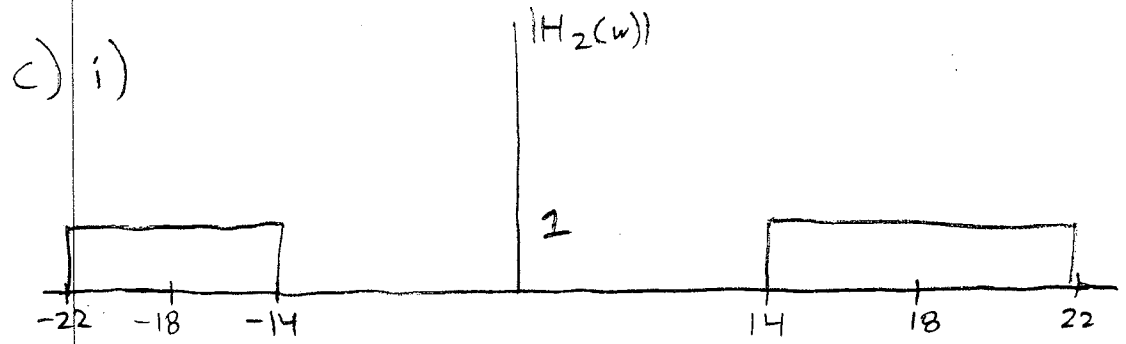
*Heights are not to scale, but are labeled.



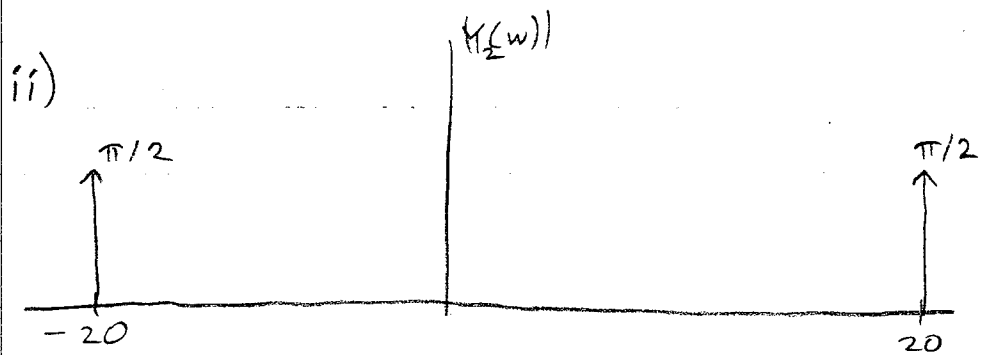
* Frequency Shift,



iii) $y_1(t) = 0$



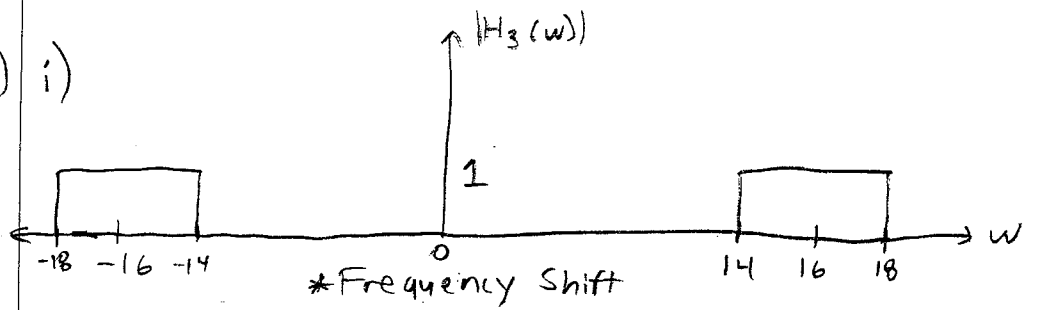
* Frequency Shift



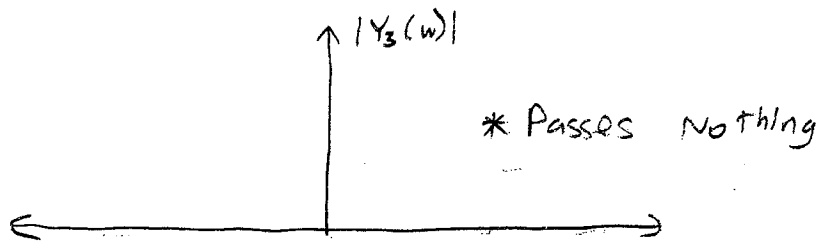
* Passes δ^2 's only.

iii) $y_2(t) = \frac{1}{2} \cos(20t)$

d) i)

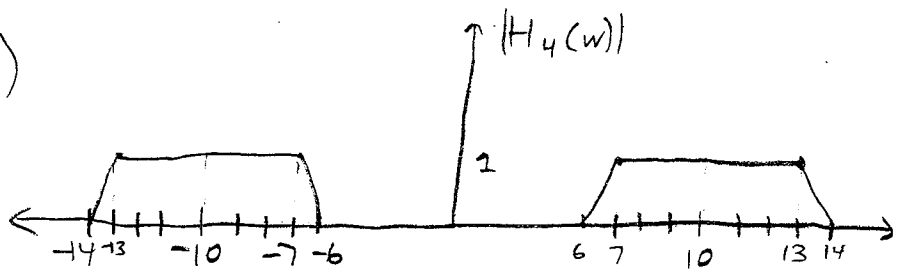


ii)



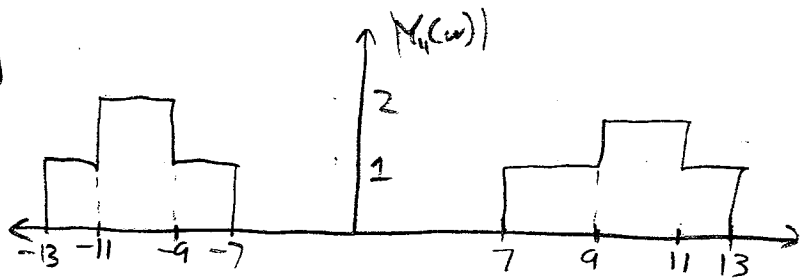
iii) $y_3(t) = 0$

e) i)



* Freq. Shift and Mult. Prop.

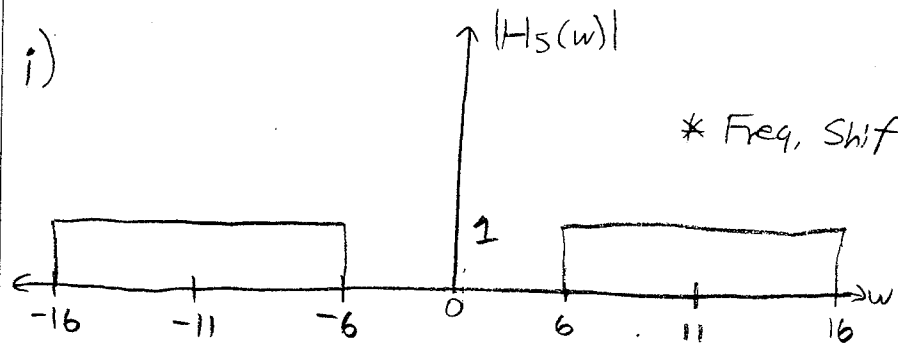
ii)



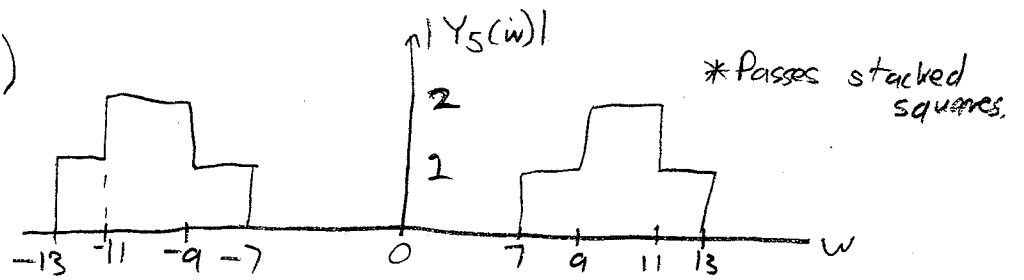
* Passes the squares stacked.

iii) $y_4(t) = 2 \cdot x_0(t) \cdot \cos(10t)$

f. i)

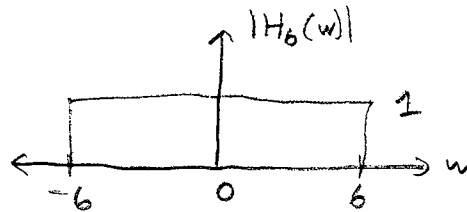


ii)



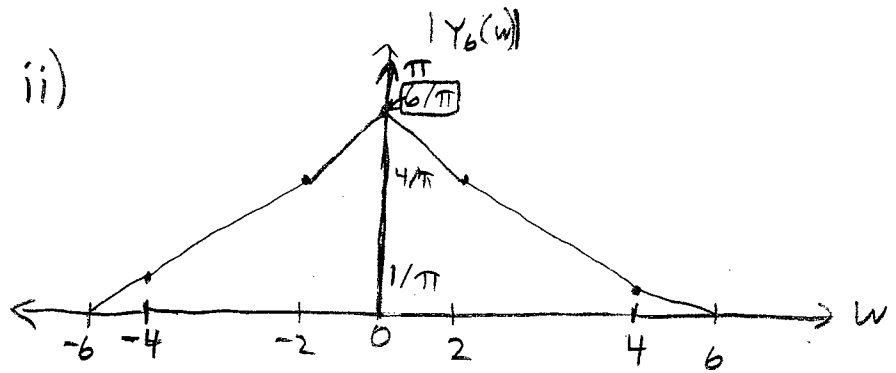
iii)
$$y_5(t) = 2 \cdot x_0(t) \cdot \cos(10t)$$

g) i)



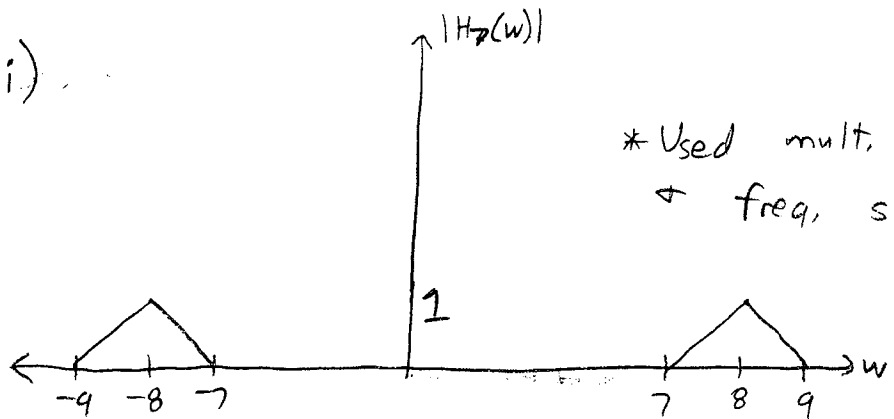
*Table

ii)



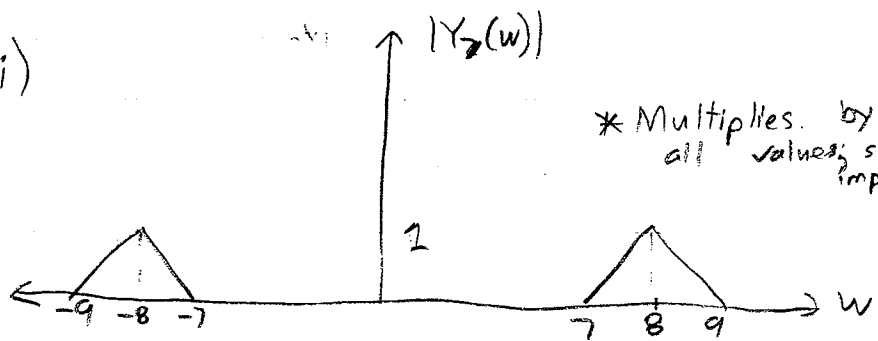
iii)
$$y_b(t) = (x_b(t))^2 + \frac{1}{2}$$

h. i)



* Used mult. prop.
+ freq. shift,

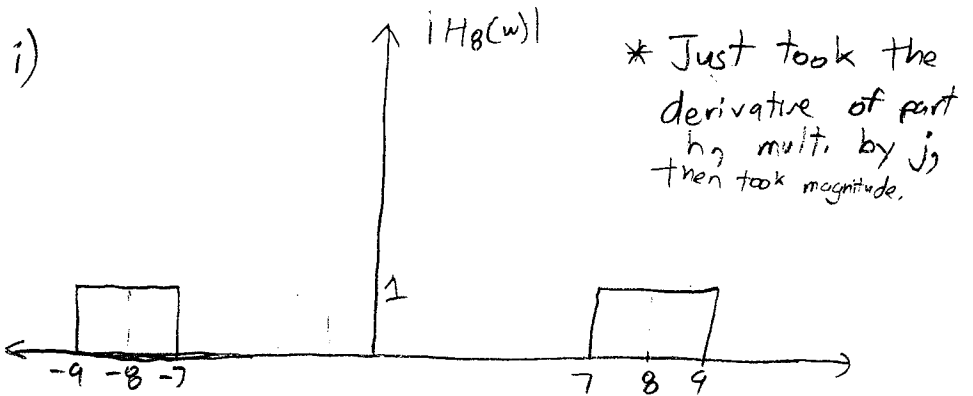
ii)



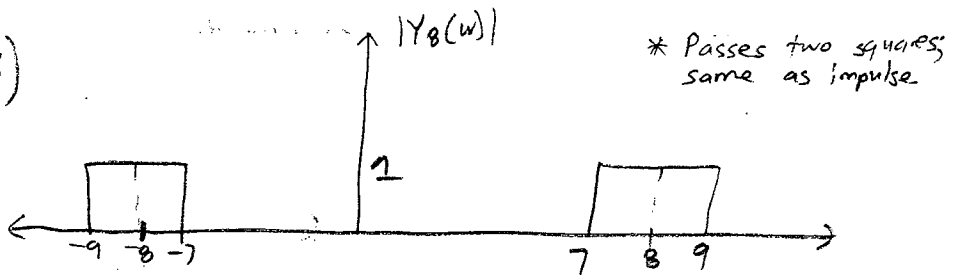
* Multiplies by 1 for
all values; same as
impulse

$$\text{iii) } Y_2(t) = 4\pi \cdot \cos(8t) \cdot \left\{ \frac{\sin(t/2)}{\pi t} \right\}^2$$

i)



ii)



iii) $y_B(t) = 4\pi \cdot t \cdot \left\{ \frac{\sin(\frac{t}{2})}{\pi t} \right\}^2 \cdot \cos(8t)$