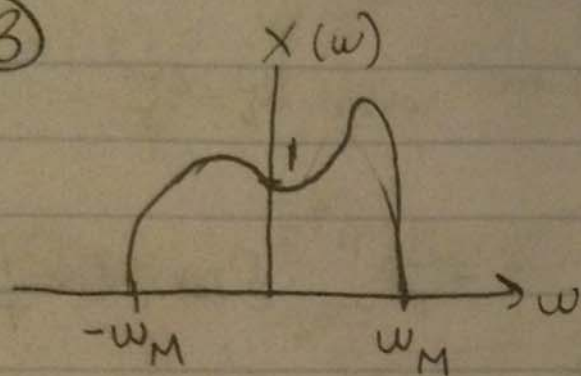


③



$$y(t) = x(t) \cos(\omega_c t)$$

We know that multiplying a signal in the time domain is equal to shifting in the frequency domain. i.e.

$$e^{j\omega_0 t} x(t) \Rightarrow X(\omega - \omega_0)$$

$$y(t) = \cos(\omega_c t) x(t)$$

$$= \frac{1}{2} (e^{j\omega_c t} + e^{-j\omega_c t}) x(t) = \frac{1}{2} (e^{j\omega_c t} x(t) + e^{-j\omega_c t} x(t)) \Rightarrow$$

$$\Rightarrow \frac{1}{2} (X(\omega - \omega_c) + X(\omega + \omega_c)) = \frac{1}{2} X(\omega - \omega_c) + \frac{1}{2} X(\omega + \omega_c)$$

$$Y(\omega) = \frac{1}{2} X(\omega - \omega_c) + \frac{1}{2} X(\omega + \omega_c)$$

