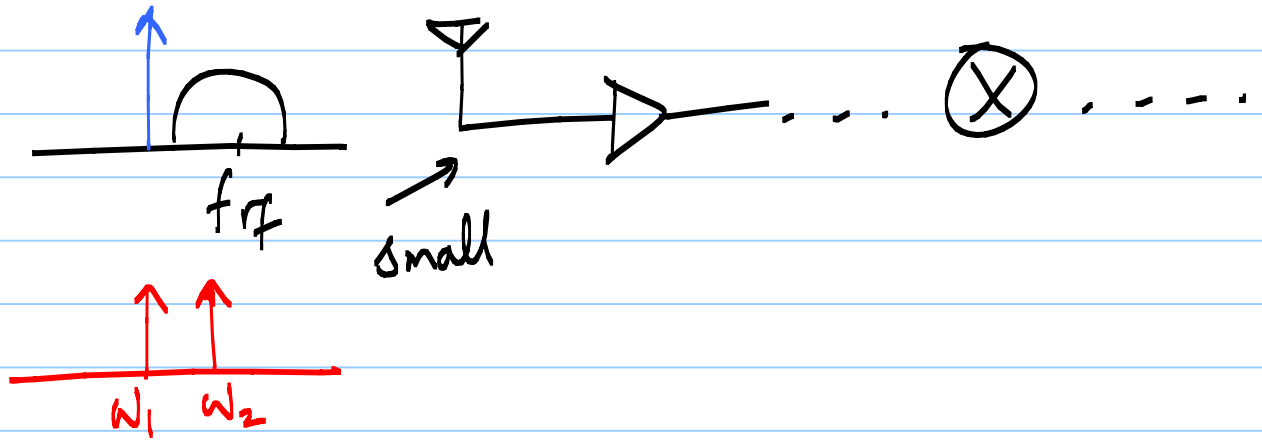
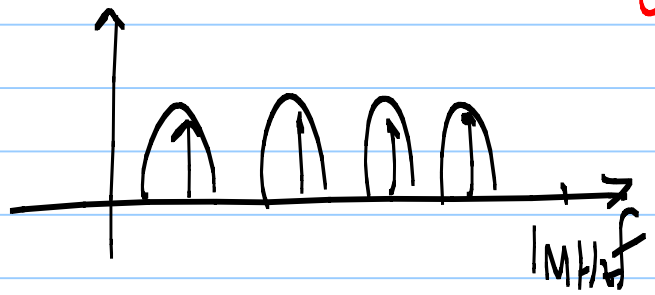
28/1/20

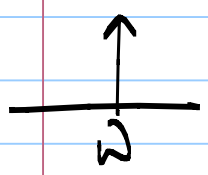
Lec 7

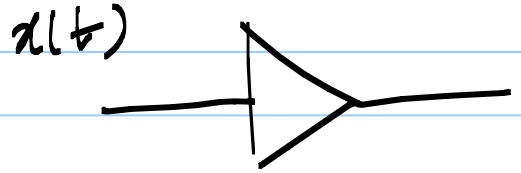
OFDM - orthogonal frequency division multiplexing

Receiver



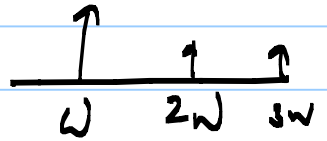






DC ideal small signal gain

$$y(t) = \alpha_0 + \alpha_1 x(t) + \alpha_2 x^2(t) + \alpha_3 x^3(t) + \dots$$



$$x(t) = A\cos\omega t$$

$$y(t) = \alpha_0 + \alpha_1 A\cos\omega t + \alpha_2 A^2\cos^2\omega t + \alpha_3 A^3\cos^3\omega t$$

$$\cos^2\omega t = \frac{1+\cos 2\omega t}{2}$$

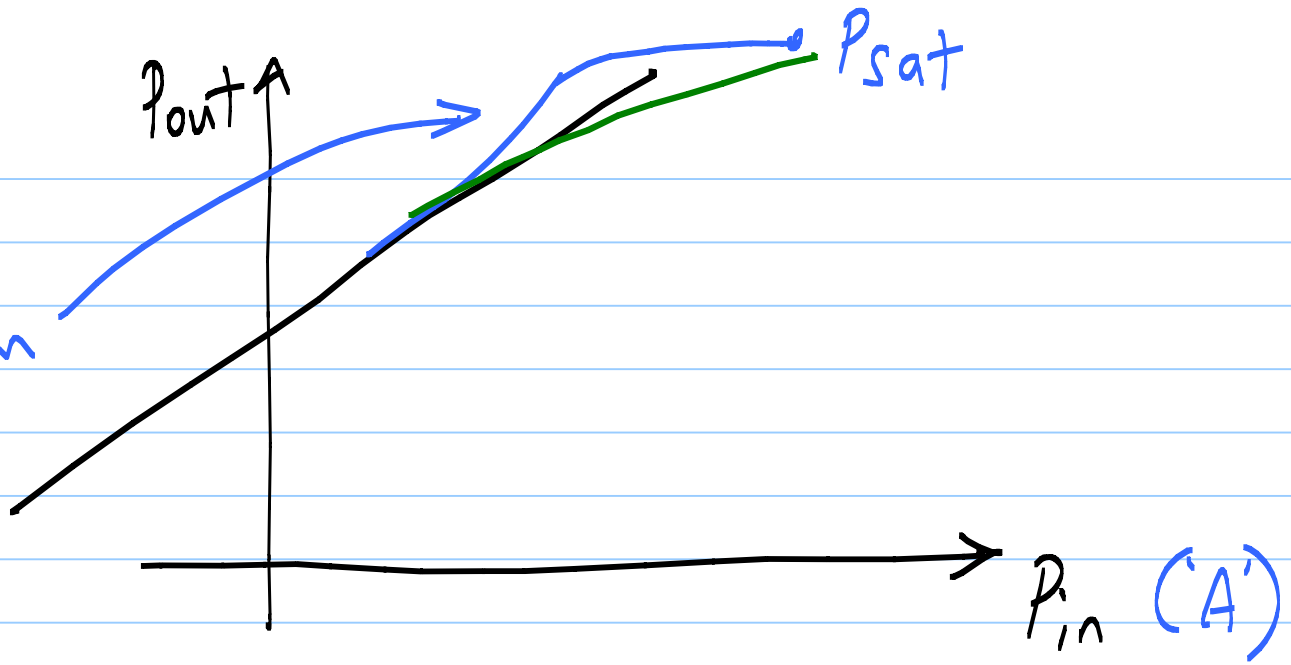
$$\cos^3\omega t = \frac{3\cos\omega t + \cos 3\omega t}{4}$$

compression $\alpha_3 < 0$

$$y(t) = \left(\alpha_0 + \frac{\alpha_2 A^2}{2}\right) + \left(\alpha_1 + \frac{3\alpha_3 A^2}{4}\right) A\cos\omega t + \frac{\alpha_2 A^2}{2}\cos 2\omega t + \frac{\alpha_3 A^3}{4}\cos 3\omega t$$

If $\alpha_3 > 0$

gain expansion



$A\cos\omega_1 t + A\cos\omega_2 t$ → $y(t) = ?$

$\omega_2 - \omega_1 = \Delta\omega$