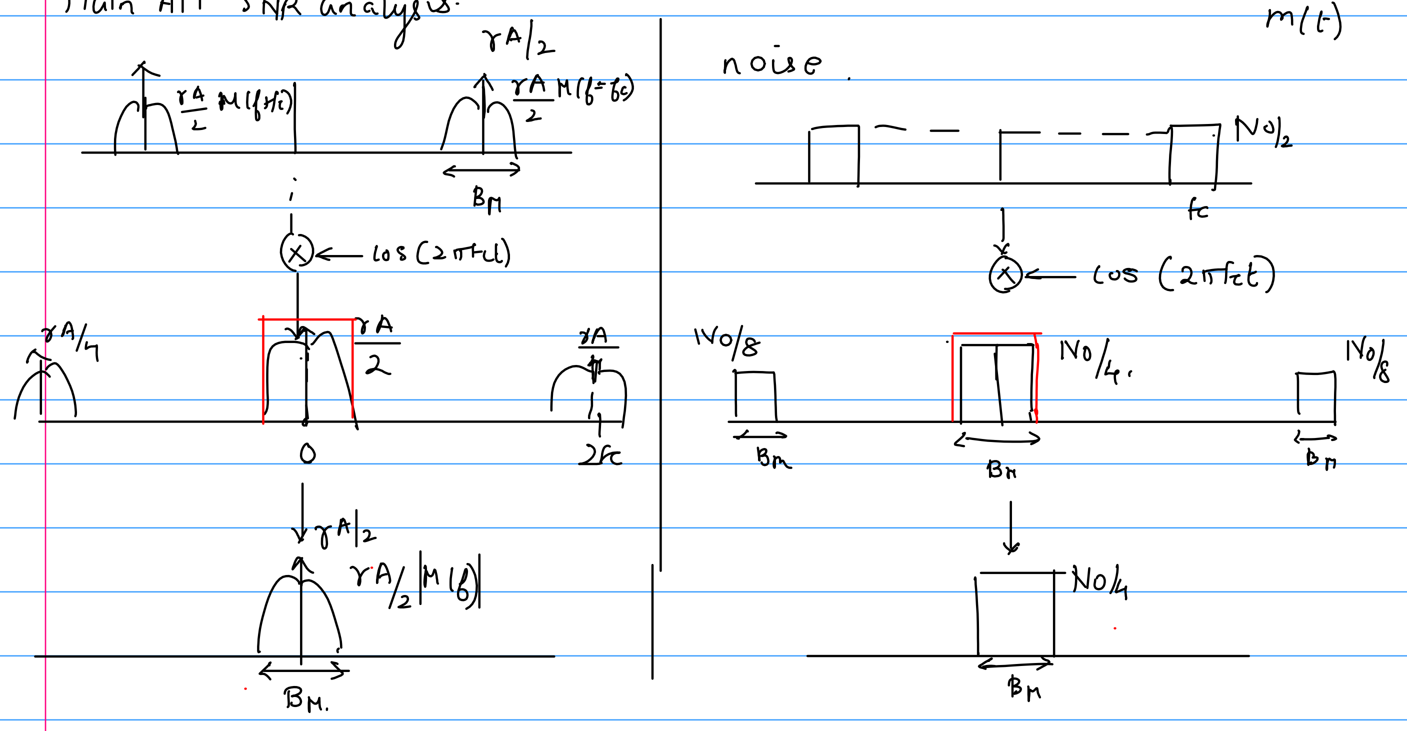
Plain AM SNR analysis. → sending $x(t) = A\cos(2\pi f_c t) + A\cos(2\pi f_c t)\cdot m(t)$



$$SNR_{plain\,AM} = \frac{\gamma^2 A^2/4 \cdot P_m}{N_0/4 \cdot B_m} = \left(\frac{\gamma^2 A^2 P_m}{N_0 B_m}\right)$$

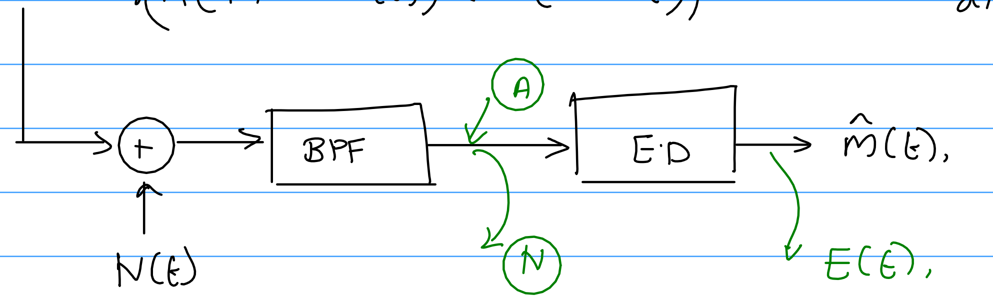
$SNR_{plain AM}$ is a fraction of SNR_{DSB} when considering equal transmit powers.

H/W: find out what fraction.

What about plain AM with envelope detection?

$$y(t) = \gamma\left(A\cos(2\pi f_c t) + A\,m(t)\cdot\cos(2\pi f_c t)\right)$$
$$= \gamma\left(A(1+\alpha\,m(t))\cdot\cos(2\pi f_c t)\right)$$

for no envelope distortion.



What is the desired and noise signal components at A?

desired signal is $\gamma A(1+\alpha m(t))\cdot\cos(2\pi f_c t)$.

N is $N_I(t)\cos(2\pi f_c t) - N_Q(t)\sin(2\pi f_c t)$.

$$\left(\gamma A(1+\alpha m(t)) + N_I(t)\right)\cos(2\pi f_c t) - N_Q(t)\sin(2\pi f_c t)$$

what is the envelope of this signal?

$$E(t) = \sqrt{\left(\gamma A(1+\alpha m(t)) + N_I(t)\right)^2 + N_Q^2(t)}$$

find out the SNR in E(t).

If we assume that our SNR_{ed} is high then

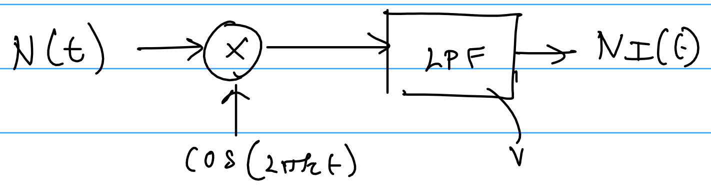
$$\left(\gamma A(1+\alpha m(t)) + N_I(t)\right)^2 \gg N_Q(t)^2$$

$$E(t) \approx \gamma A(1+\alpha m(t)) + N_I(t)$$

SNR using this approximation?

$$SNR_{ed} = \left(\frac{\gamma^2 A^2 \alpha^2 \cdot P_m}{(N_0 B_M)}\right).$$

what is $N_I(t)$?



PSD of $N_I(t)$?