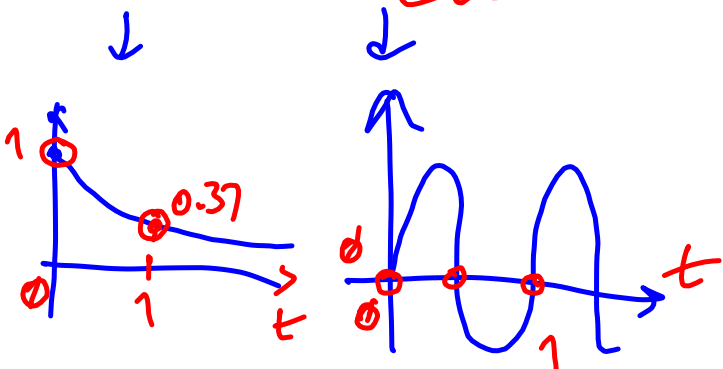


CPE381_5

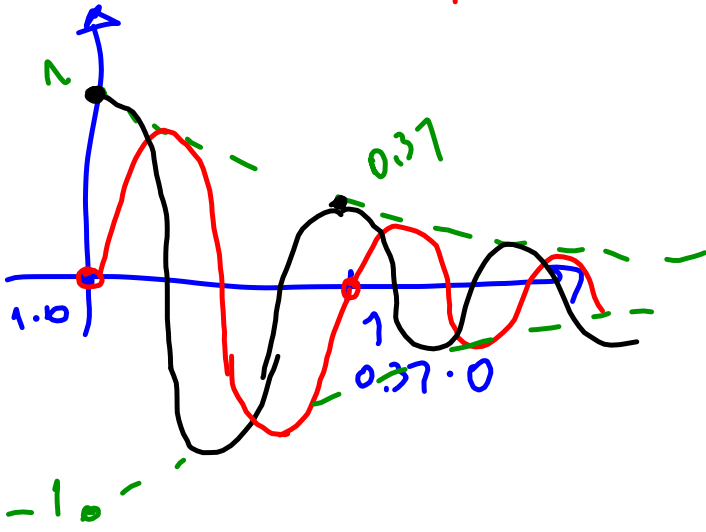
$e^{-t} \cdot \sin(2\pi t)$

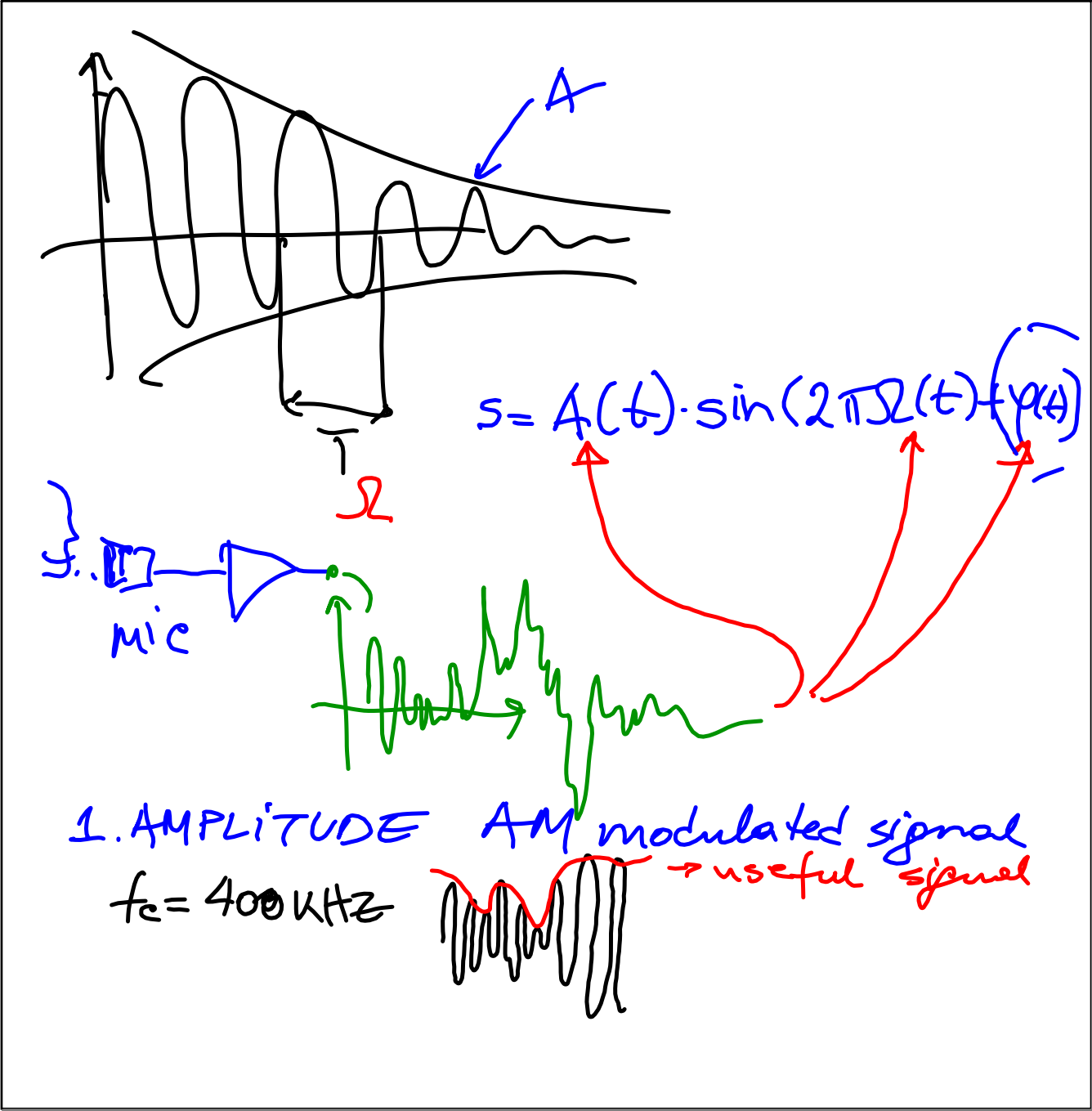


$e = 2.71$

$e^{-t} = \frac{1}{e^t}, t = \frac{1}{e} = 1$

$t = 1 \Rightarrow \frac{1}{e} = 0.37$



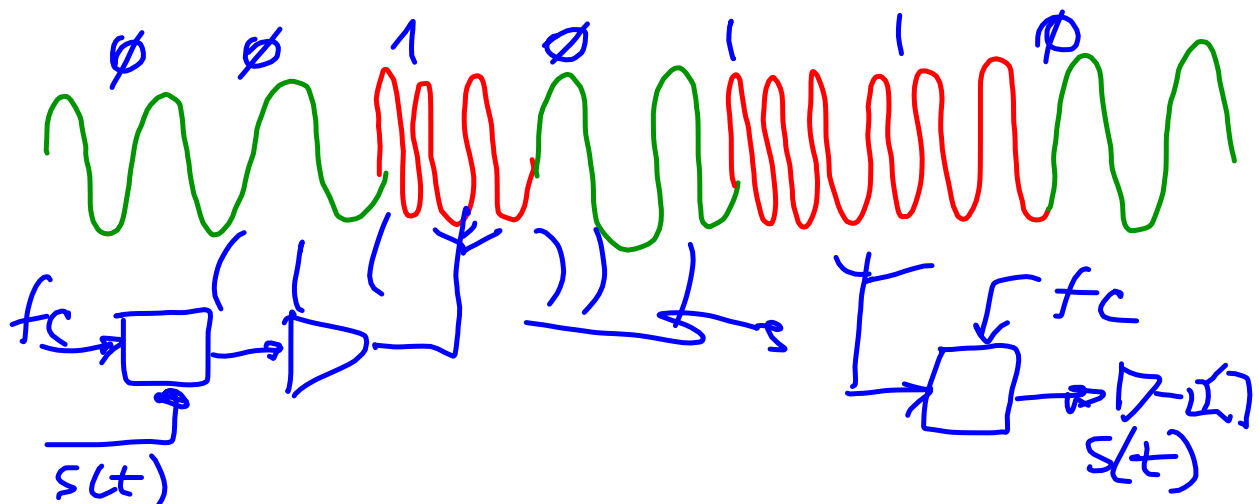


2. Frequency modulation

$$f_c = f_{c1} + \Delta f(s(t))$$

↓
89.3 MHz

1 900 MHz → 906 MHz
1 920 MHz



3. PHASE MODULATION

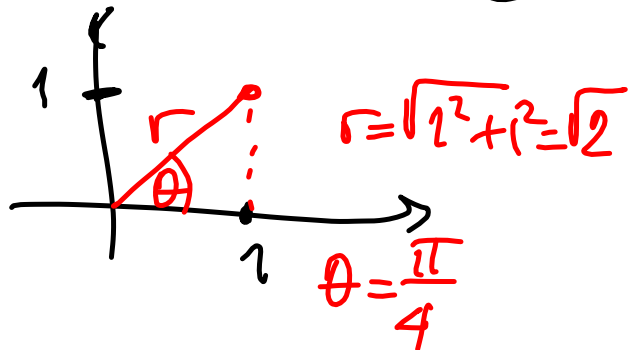
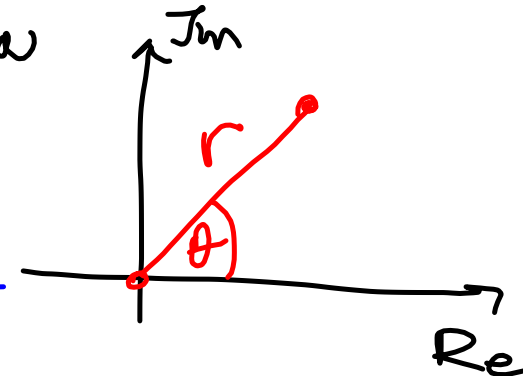
POLAR REPRESENTATION

$$r \cdot e^{j\theta}$$

$$e^{j\theta} = \cos \theta + j \sin \theta$$

$$\underbrace{1}_{\text{Re}} + \underbrace{j \cdot 1}_{\text{Im}} \Rightarrow r \cdot e^{j\theta} =$$

$$= \sqrt{2} e^{j\frac{\pi}{4}}$$



$$(1+j) \cdot e^{j\frac{\pi t}{2}}$$

$$\downarrow \quad \cos(\quad) + j(\sin(\quad))$$

$$\sqrt{2} e^{j\frac{\pi}{4}} \cdot e^{j\frac{\pi t}{2}} = \sqrt{2} \cdot e^{j\frac{\pi t}{2}} + j \frac{1}{4}$$

$$e^a \cdot e^b = e^{a+b}$$

$$= \sqrt{2} e^{j(\frac{\pi}{2}t + \frac{\pi}{4})}$$

$$= \sqrt{2} \cdot \underbrace{\cos(\quad) + j \sin(\quad)}_{\cos(\quad) + j \sin(\quad)}$$

$$= \sqrt{2} \cdot \cos\left(\frac{\pi}{2} \cdot t + \frac{\pi}{4}\right) + j \sqrt{2} \sin\left(\frac{\pi}{2} \cdot t + \frac{\pi}{4}\right)$$

$$\cos\left(\frac{\pi}{2}t\right) \Rightarrow T = ?$$

$$\frac{2\pi}{T} = \frac{\pi}{2} \quad \text{where } 2\pi \cdot f = \frac{2\pi}{T}$$

$$\boxed{\begin{aligned} T &= 4 \text{ s} \\ f &= 0.25 \text{ Hz} \end{aligned}}$$

