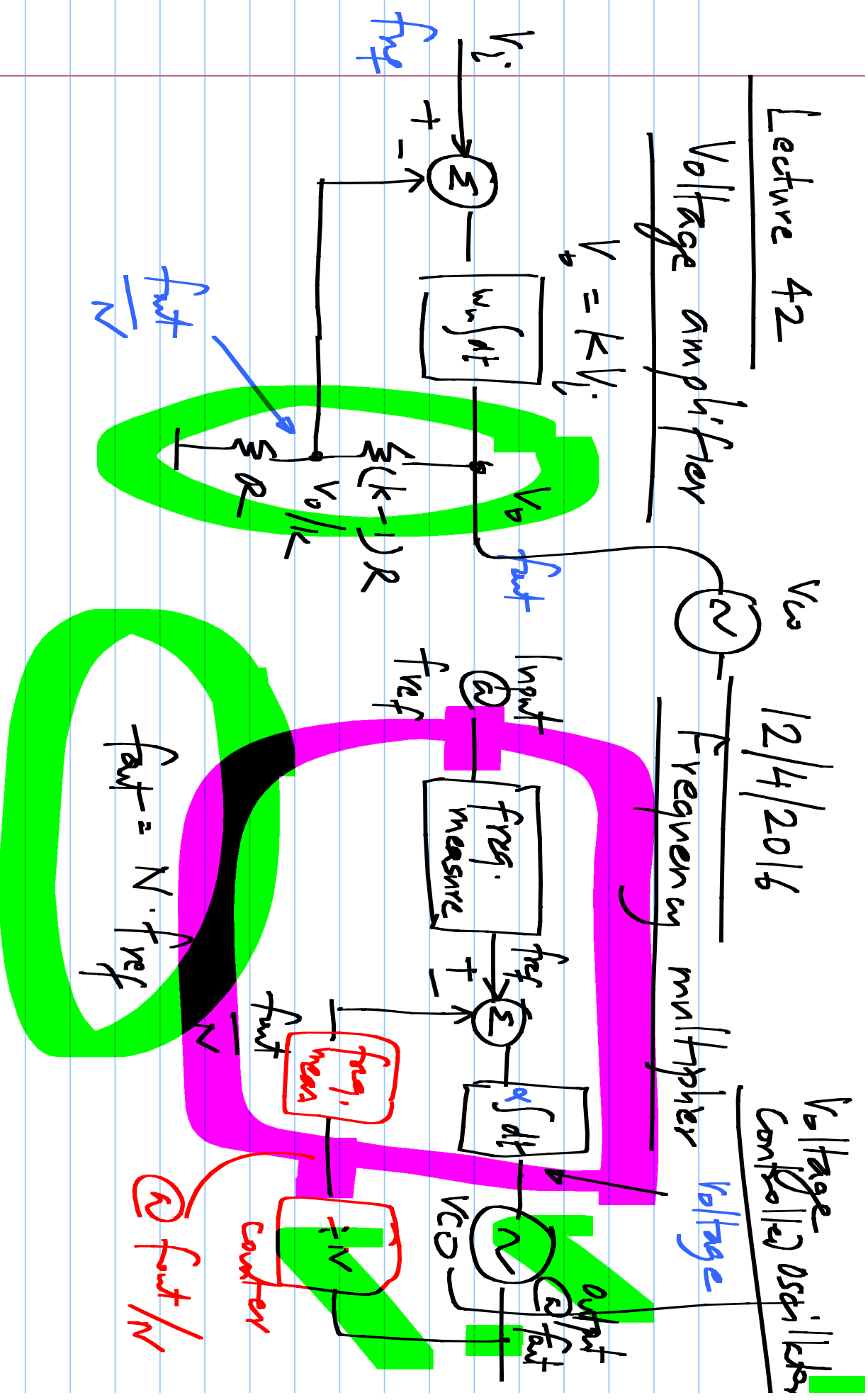


$V_{\text{tag}} \parallel V_{\text{osc}} \parallel V_{\text{ctrl}}$

Frequency multiplier



$$V_{co} \xrightarrow{\text{free-running freq.}} \cos(2\pi f_o t + 2\pi K_{Vco} \int V_{ctl} \cdot dt) \quad \cos(\theta)$$

$$\xrightarrow{\text{Control voltage}} \theta$$

$$V_{co} \text{ gain}$$

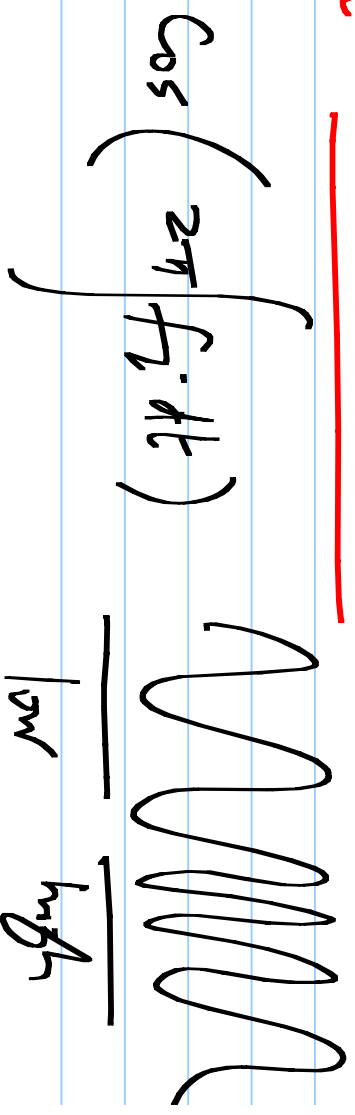
$$\theta = 2\pi f_o t$$

period: $1/f_o$

periodic in θ with a period 2π

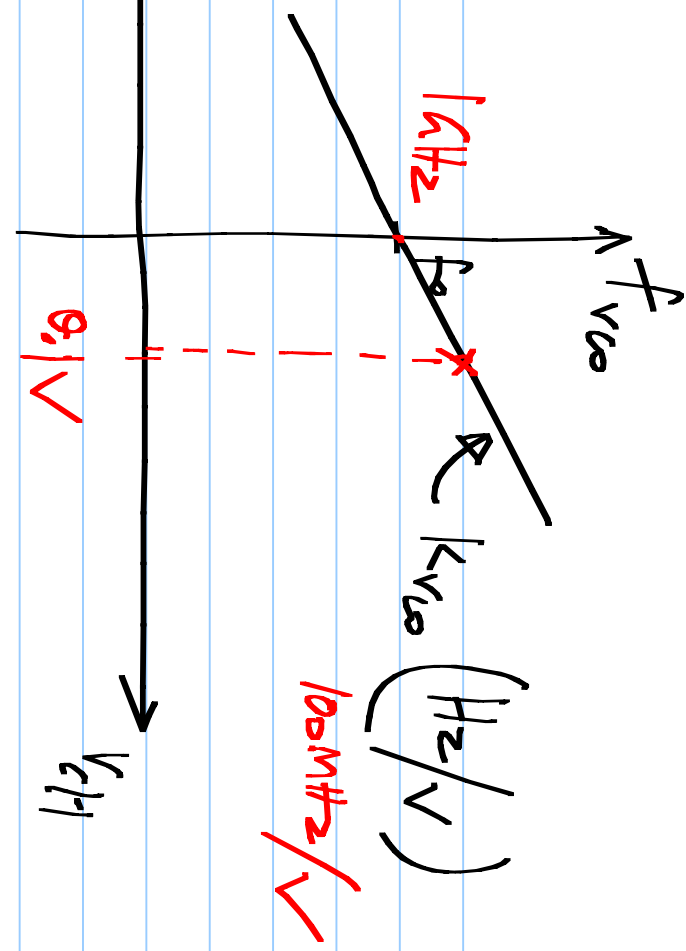
$$f_i = \frac{1}{2\pi} \cdot \frac{d\theta}{dt} = f_o + K_{Vco} \cdot V_{ctl}$$

instantaneous frequency

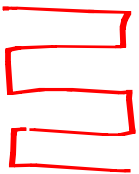


$$\theta = 2\pi f_0 t + 2\pi K_{vco} \int v_{ctrl} dt$$

$$= \omega_0 t + K'_{vco} \int v_{ctrl} dt$$

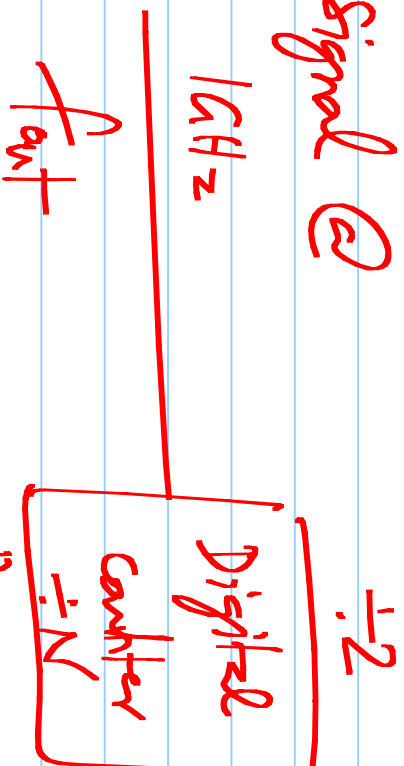


1010 MHz



$\div 1000$

Signal @



Signal @

500 MHz ?

