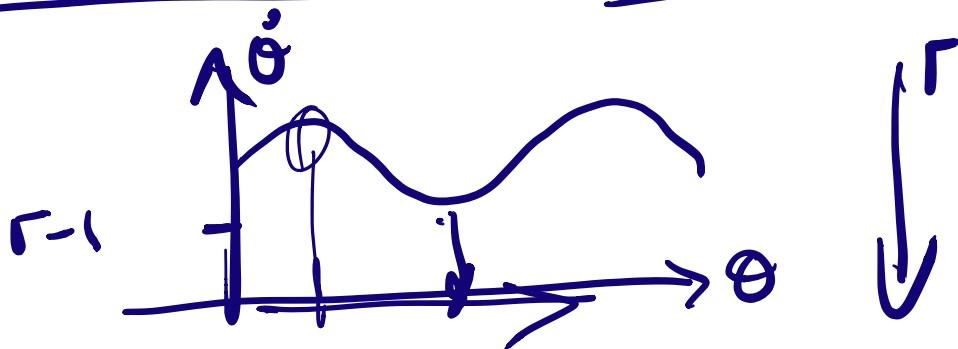


$$\dot{\theta} = f(\theta, r) \quad f(\theta + 2\pi, r) = f(\theta, r)$$

θ angle $\theta + 2\pi \sim \theta$

$$\dot{\theta} = \alpha \theta \quad \text{Not flow} \\ \text{= circle}$$

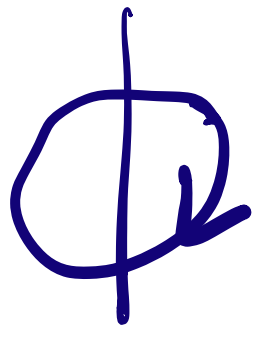
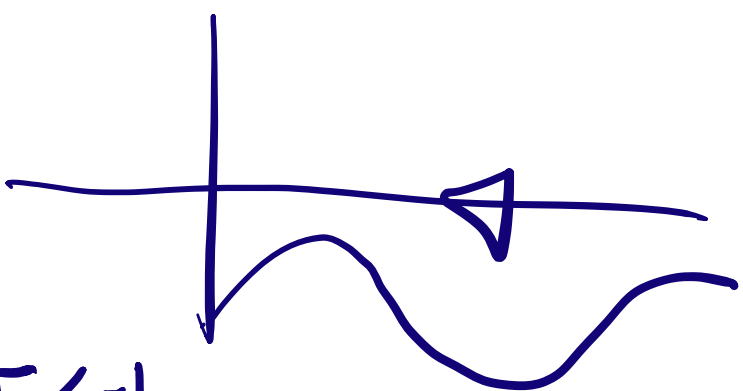
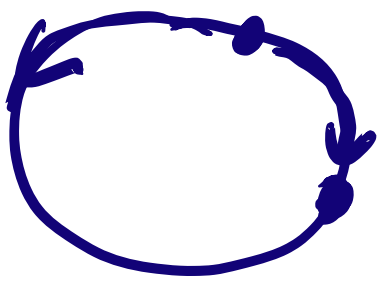
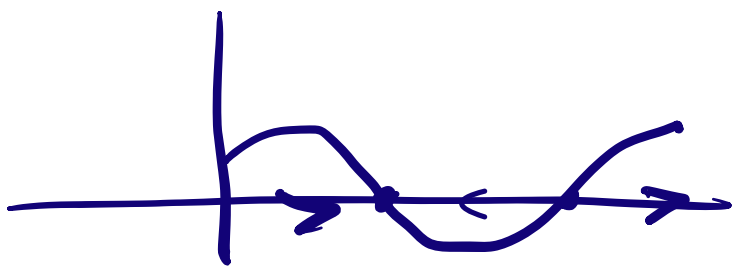
$$\dot{\theta} = r - \sin \theta \quad \underline{\underline{r > 1}}$$



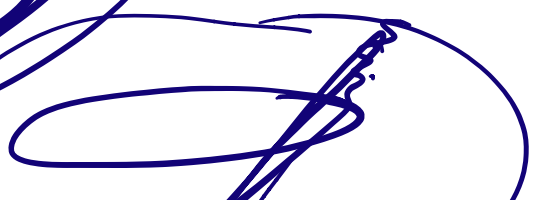
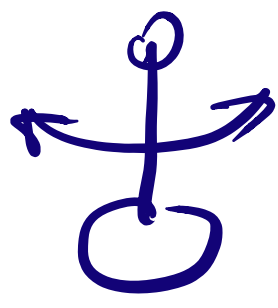
$$\frac{d\theta}{r - \sin \theta} = dt$$

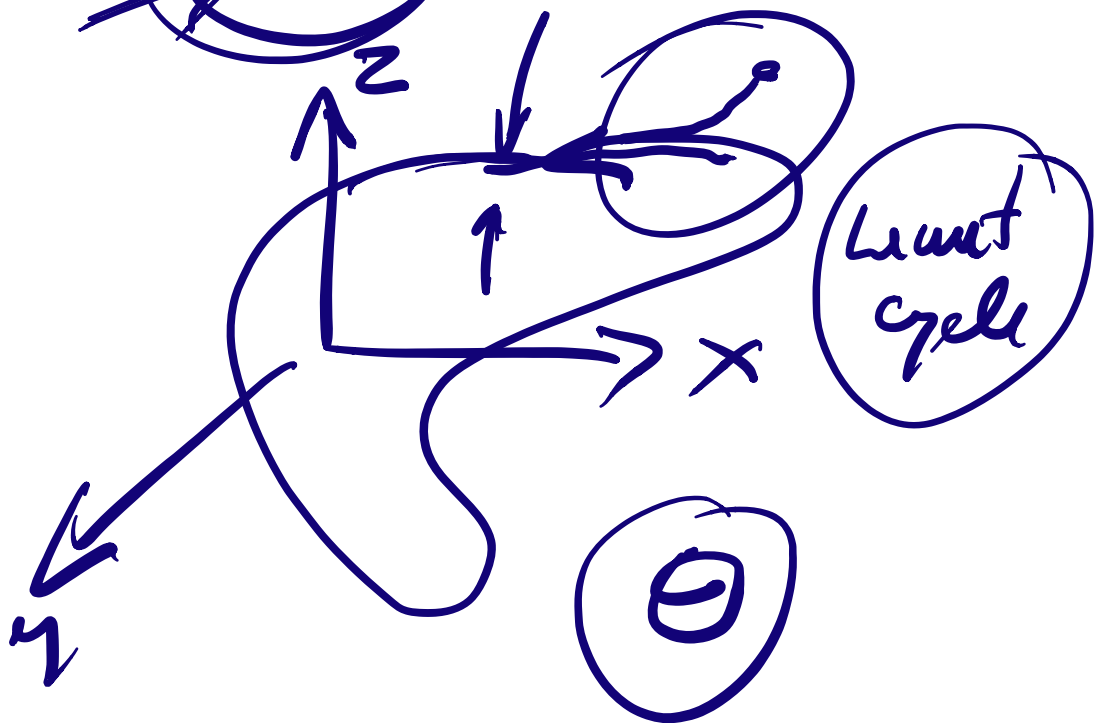
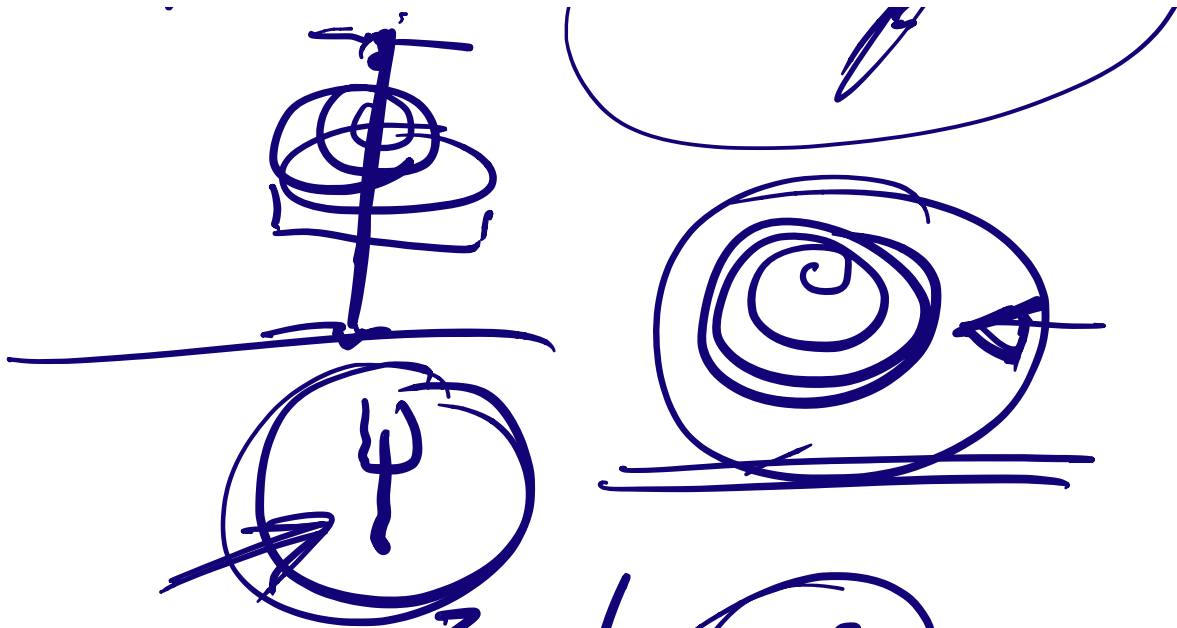
$$T = \int_0^{2\pi} \frac{d\theta}{r - \sin \theta} \equiv \frac{1}{\sqrt{r^2 - 1}}$$

—
1 < 2 < 1



1 < 2
||





$$\dot{\theta} = f(\theta)$$

$$\dot{\theta}_1 = \omega_1$$

$$T = \frac{2\pi}{\omega_1}$$

$$\dot{\theta}_2 = \omega_2$$

$$T = \frac{2\pi}{\omega_2}$$

General

$$\dot{\theta}_1 = \omega_1 + k_1(\theta_2, \theta_1)$$

$$\dot{\theta}_2 = \omega_2 + k_2(\theta_1, \theta_2)$$

$$\dot{y}_1 = F_1(y_1) + G_1(y_1, y_2)$$

$$\dot{y}_2 = F_2(y_2) + G_2(y_1, y_2)$$

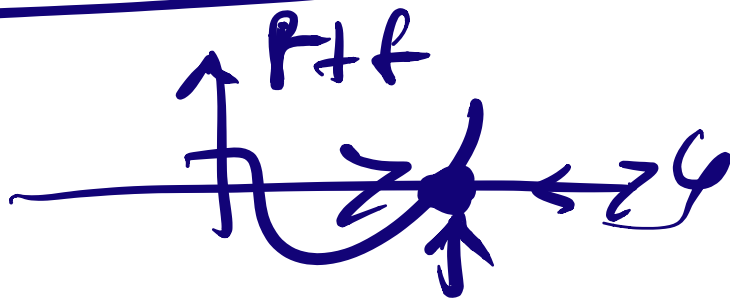
$$\dot{\theta}_1 = \omega_1 + K_1(\theta_1 - \theta_2)$$

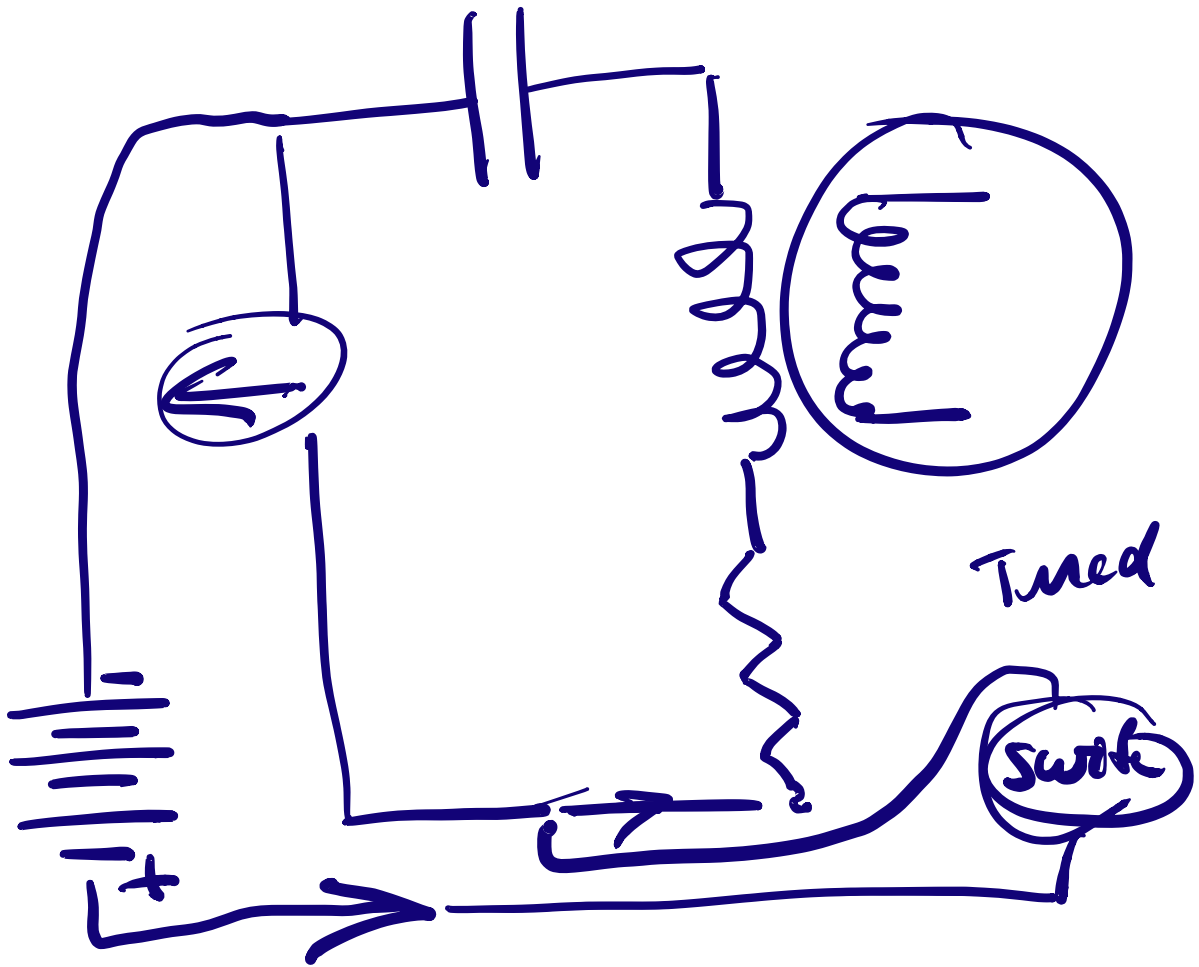
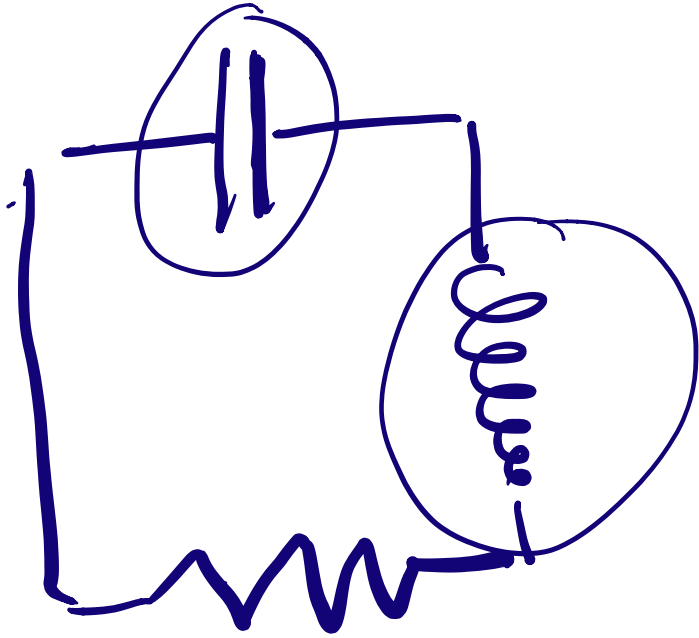
$$\dot{\theta}_2 = \omega_2 + K_2(\theta_1 - \theta_2)$$

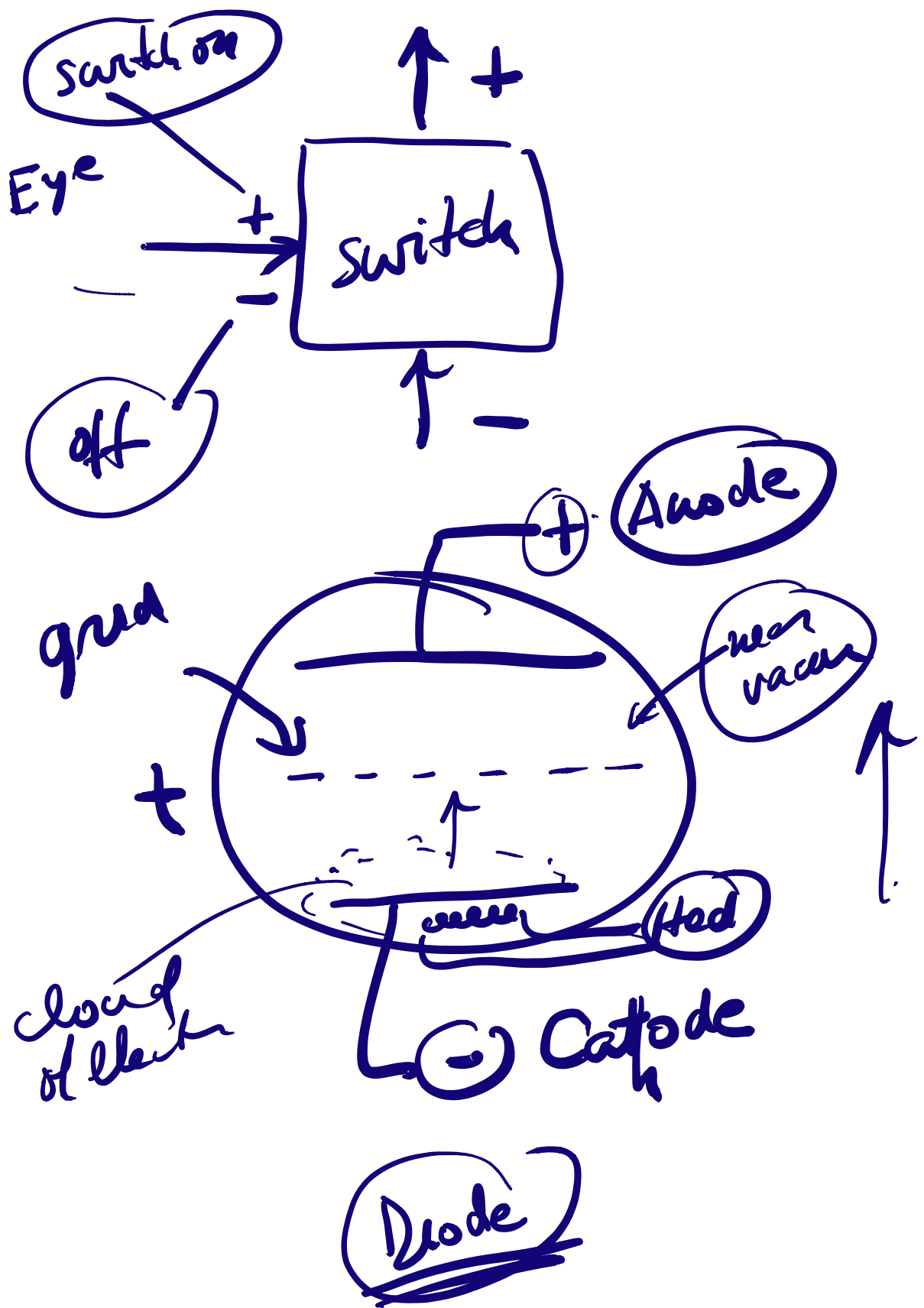
$$\underline{\underline{\varphi = \theta_1 - \theta_2}}$$

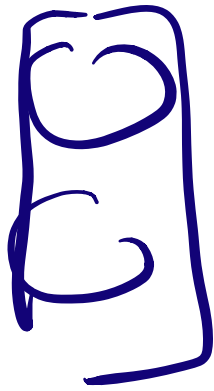
$$\dot{\varphi} = (\omega_1 - \omega_2) + K_1(\theta_1 - \theta_2) - K_2(\theta_1 - \theta_2)$$

$$\dot{\varphi} = \Gamma + f(\varphi)$$

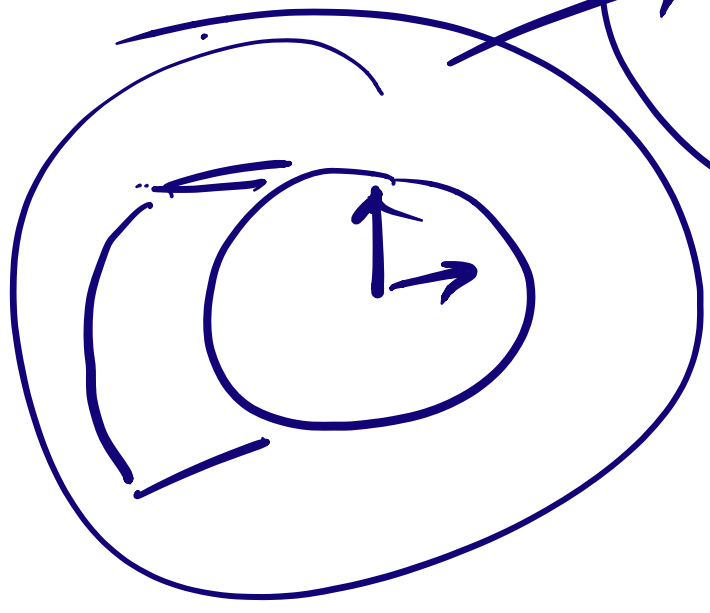
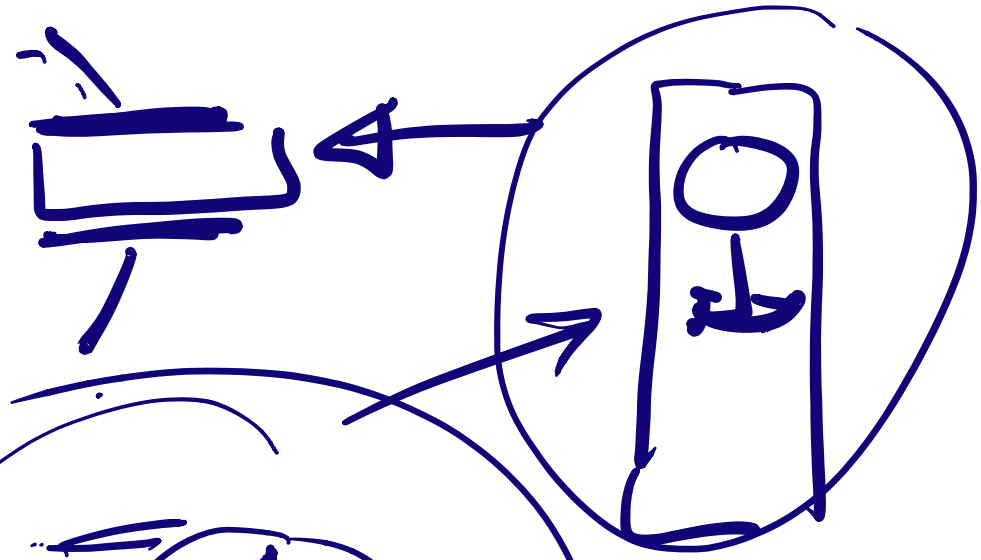
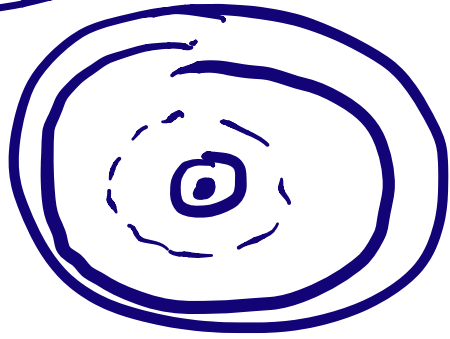






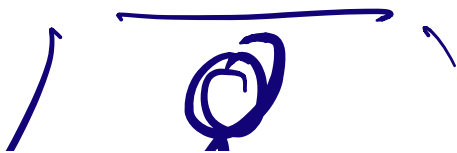
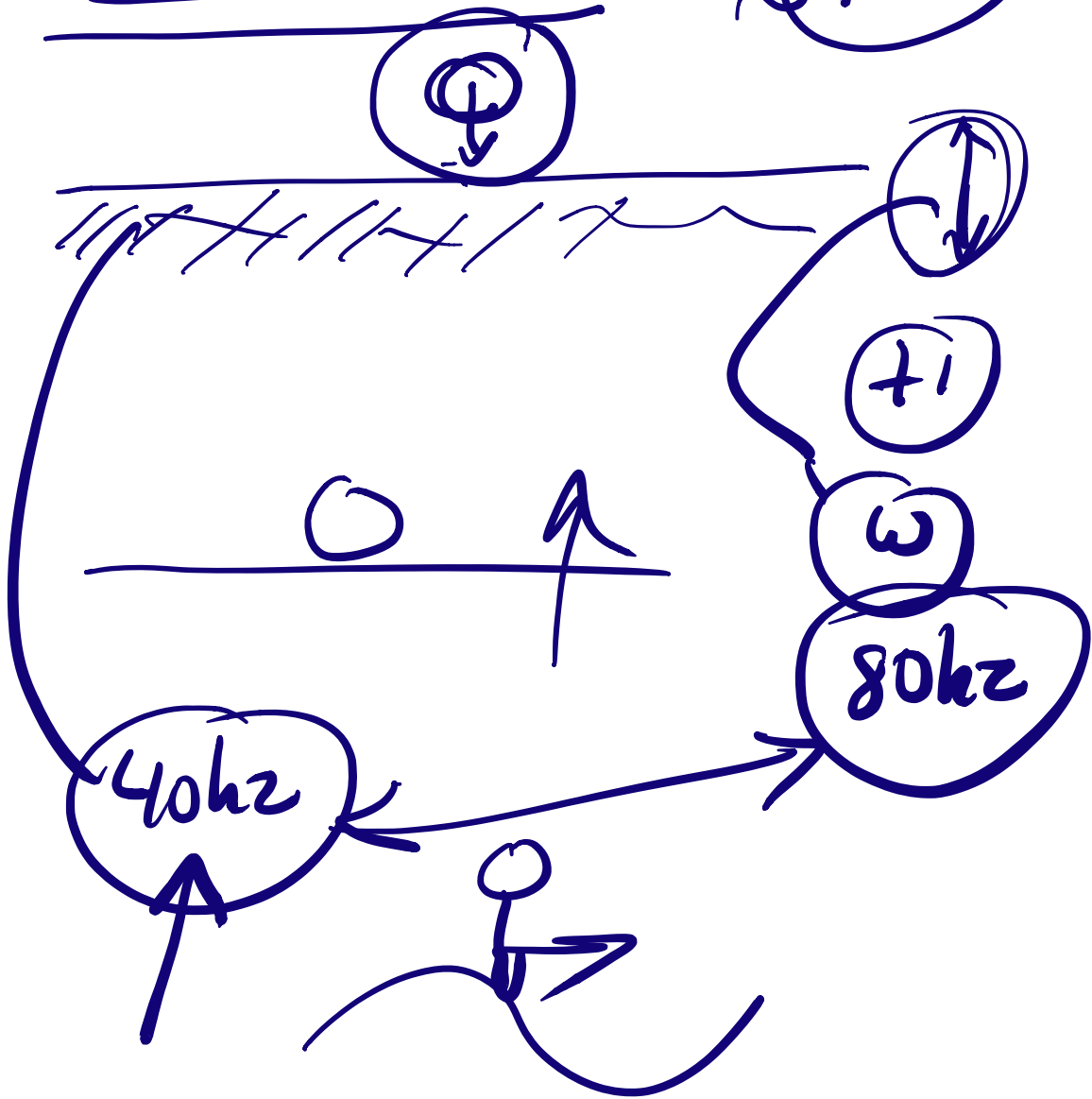


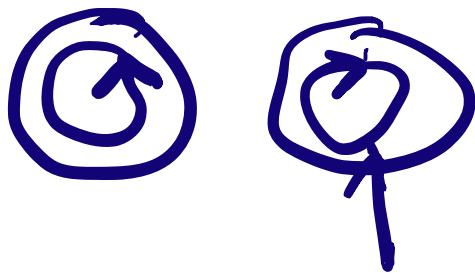
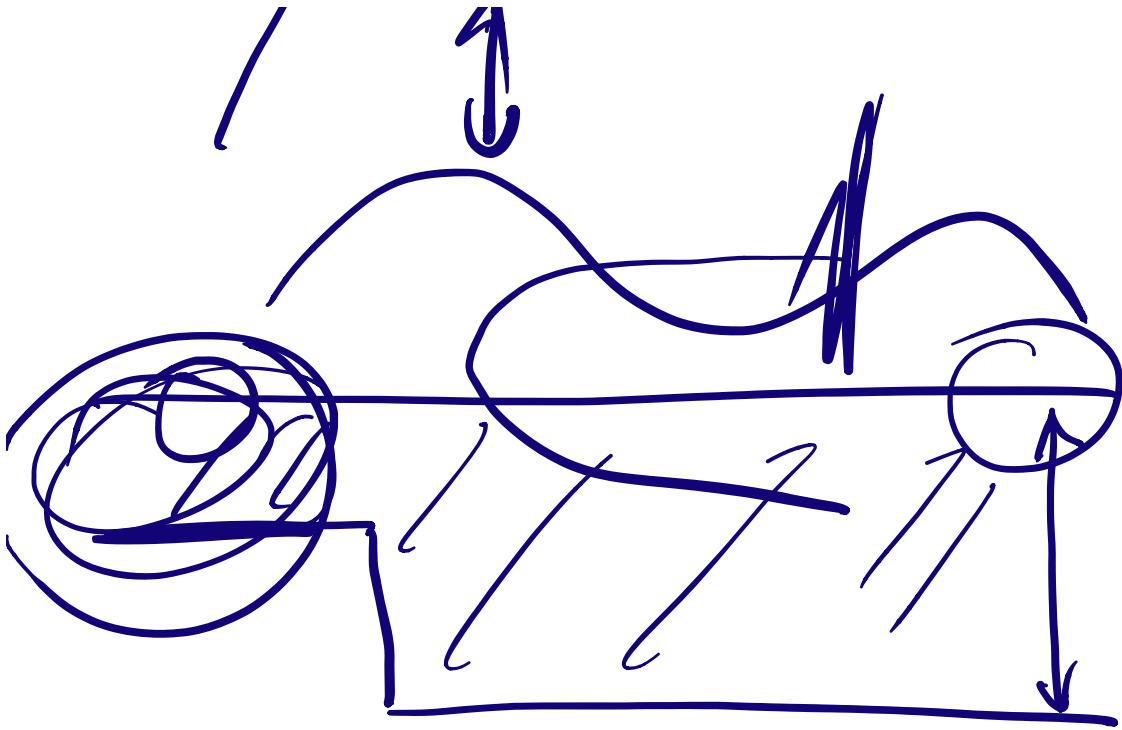
Top view

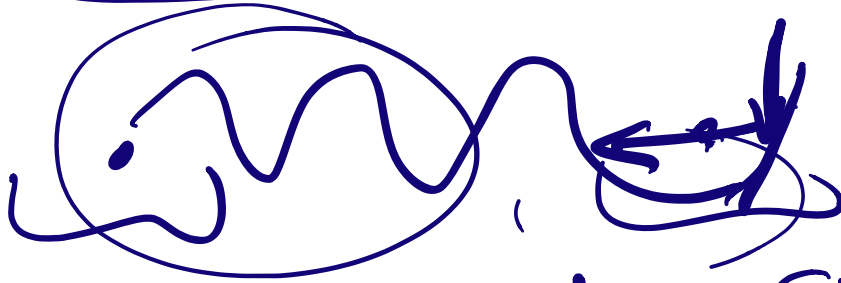
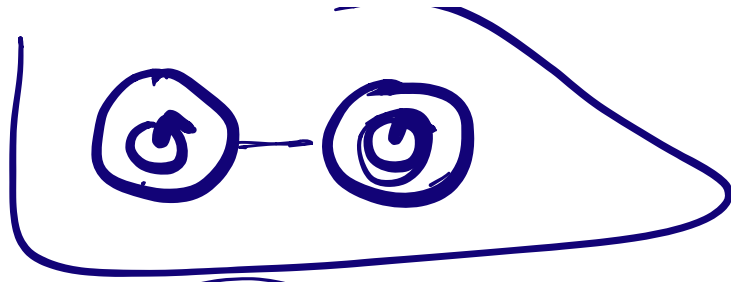


Spin locking |

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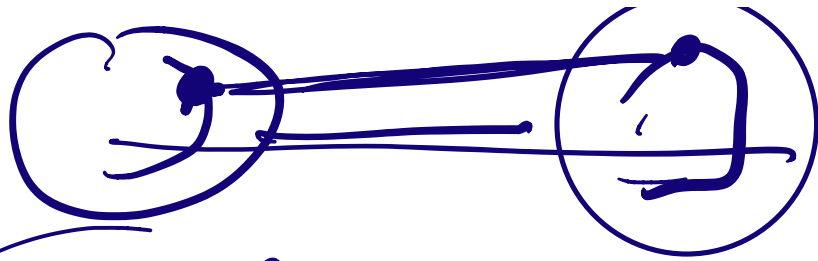


ماتریک

$$\ddot{\theta} = \frac{1}{l} (\omega^2 - \dot{\theta}^2) \theta$$

$$\ddot{\theta}_1 = \frac{1}{l} (\omega^2 - \dot{\theta}_1^2) \theta_1 + \alpha \sin(\theta_1 - \theta_2)$$

$$\ddot{\theta}_2 = \frac{1}{l} (\omega^2 - \dot{\theta}_2^2) \theta_2 - \alpha \sin(\theta_1 - \theta_2)$$



$$\underbrace{(\omega^2 - \dot{\theta}_1^2) \dot{\theta}_1}_{\text{underlined}} \sim \alpha T \text{len}(\theta_1 - \theta_2)$$

$$\sim -\alpha T \text{len}(\theta_1 - \theta_2)$$

$$\underline{\underline{\dot{\theta}_1 \sim \omega}} \quad \approx 2\omega \dot{\theta}_1$$

