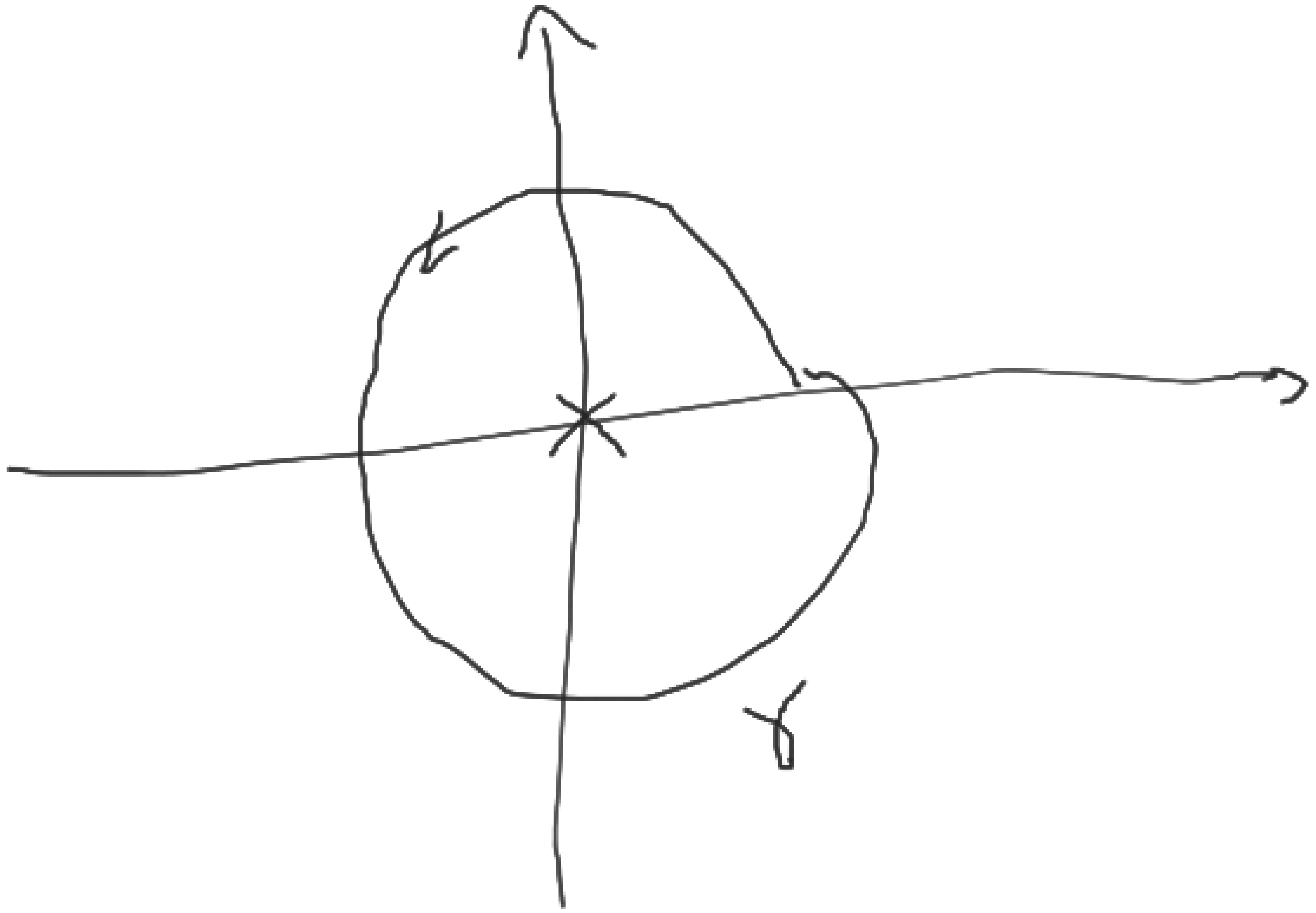
$$\dot{x}_1 = u_1$$
$$\dot{x}_2 = u_2$$
$$\dot{x}_3 = x_1 u_2 - x_2 u_1$$

$$\dot{x} = Ax + Bu$$



$$\frac{1}{2\pi i}\oint_\gamma \frac{1}{z}\,dz$$

$$\gamma = e^{i\theta}$$

$$\frac{1}{2\pi i}\int_0^{2\pi} e^{-i\theta} e^{i\theta}\cdot d\theta$$

f $\quad \oint f(z)\,dz = 0$

$$z = e^{i\theta} \rightarrow dz = i e^{i\theta} d\theta$$

$$\frac{dz}{z} = \frac{i \cancel{e^{i\theta}} d\theta}{\cancel{e^{i\theta}}}$$

$$\frac{1}{2\pi} \int d\theta = 1$$

$$z = e^{in\theta}$$

$$\frac{dz}{z} = \frac{in\cancel{e^{in\theta}}\,d\theta}{\cancel{e^{in\theta}}}$$

$$\frac{n}{2\pi}\int d\theta$$

$$\int_{\gamma} \frac{1}{z-a}\, dz$$

$$\oint_{\Gamma} \frac{1}{w}\, dw = \#\ \Gamma \text{ winds ar. } 0$$

$$\Gamma = 1 + \sigma(\gamma)$$

$$\oint_{\Gamma} \frac{dw}{w} = \oint_{F\circ\gamma} \frac{dw}{w}$$

$$\Gamma = F(\gamma)$$

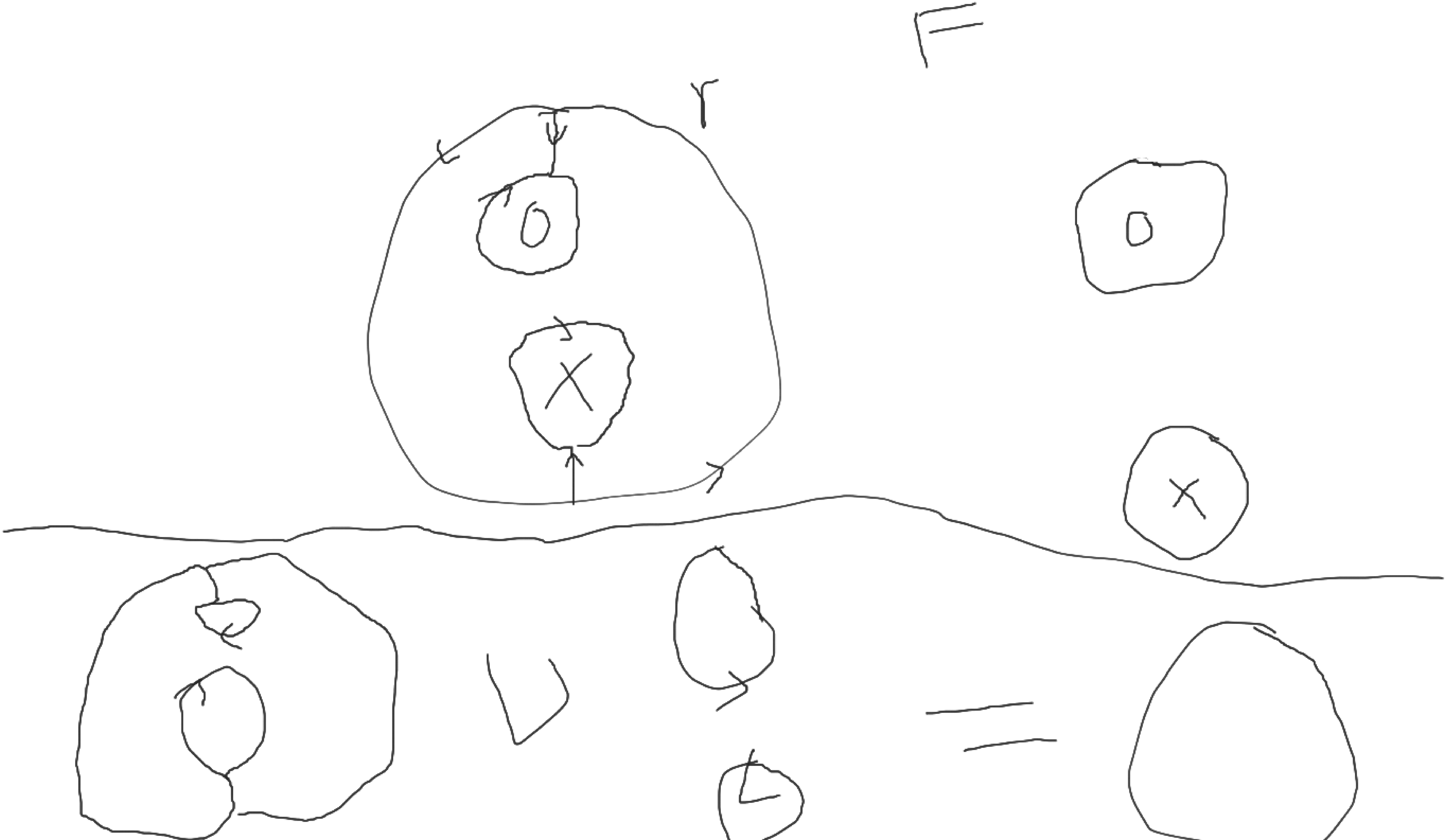
$$= \oint_{\gamma} \frac{F' \, dF}{F}$$

$Z - P$ of F

zeros of F

Poles

$$F = 1 + \frac{N}{D}$$



$$N = \int \frac{1}{1+w}\,dw = Z - P$$

$$\int \quad \Gamma(\,)$$

Z ↓ ≤ 1. pol.

P ↓ $\theta\ell$ pol.

$$Z = N + P$$