

RIEMANN SURFACE For $w = \log z$

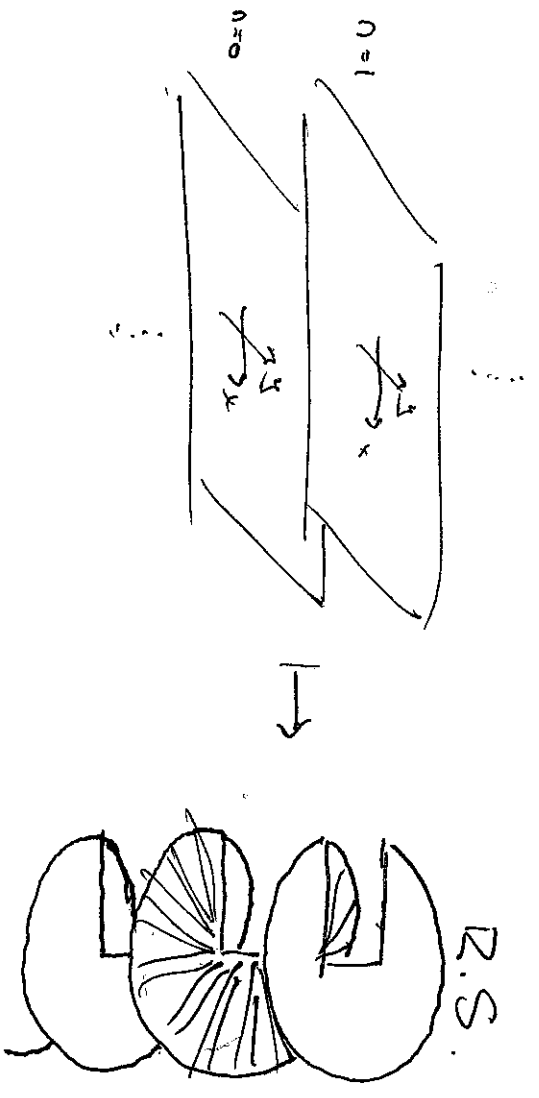
Def: of R.S.: Complex plane of more than one sheet as branch.

$$w = \log z = \log|z| + i \arg z = \log|z| + i\theta$$

Define branches of $\log z$ at $\theta = \pi + 2\pi n$

$$n=0 \quad |z| > 0 \quad -\pi < \theta < \pi \quad \mapsto \quad u = \log|z| \in (-\infty, \infty) \\ v \in (-\pi, \pi)$$

$$n=1 \quad |z| > 0 \quad \pi < \theta < 3\pi \quad \mapsto \quad u = \log|z| \\ v \in (\pi, 3\pi)$$



Curves in w $\ni v \in \mathbb{C} \quad u \in (-\infty, \infty)$

Inverse maps to rays $\theta = c$

$$r \in (0, \infty)$$

Curves in w $\ni u = c \quad v \in (-\infty, \infty)$

Inverse map to "spirals" on

the R.S. of $r = c$

$$\theta \in (-\infty, \infty)$$

