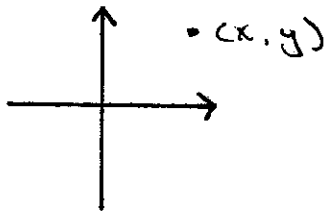
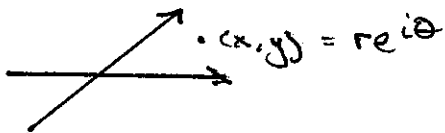


# BRANCHES & CUTS

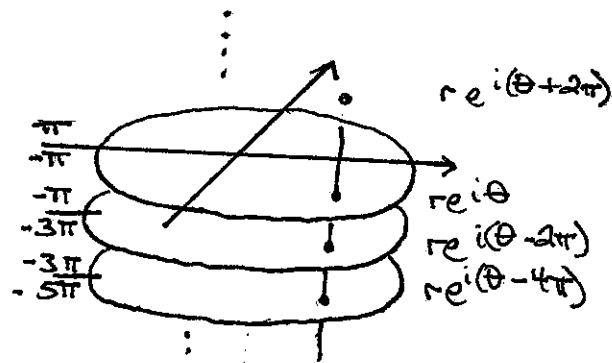
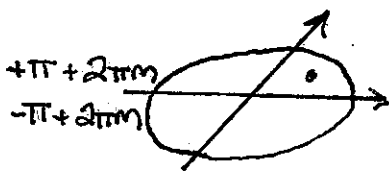
- VIEW FROM ABOVE:



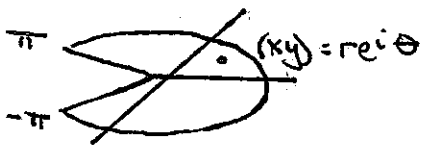
- VIEW FROM SIDE



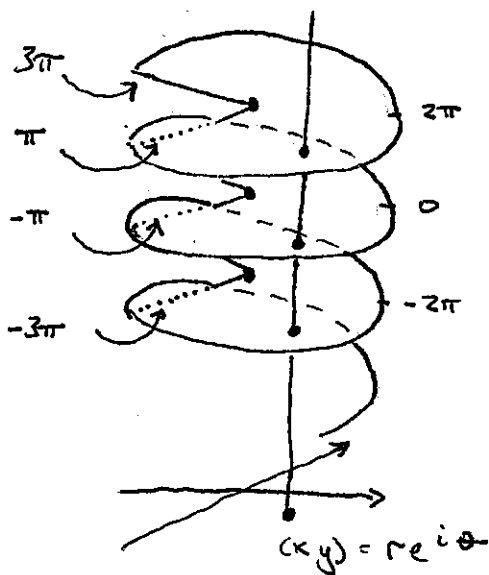
- MULTIPLE VALUES OF  $\theta$



- CUT THE PLANE @  $-\pi/\pi$



- CONNECT BRANCHES AS  $\theta$  GOES FROM  $-\infty$  TO  $\infty$ .



- THE P.V. OCCURS ON THE BRANCH OF  $\arg z$  WHEN  $\theta \in (-\pi, \pi]$
- THE BRANCH CUT OCCURS AT  $\theta = \pm\pi$ .
- THE BRANCH POINT IS  $z = 0$ .
- THE P.V. INCLUDES  $\theta = \pi$ .  $\theta \in (-\pi, \pi]$  THE BRANCH DOES NOT.  $\theta \in (\pi, \pi)$
- THE BRANCH POINT  $z = 0$  IS ON ALL BRANCHES.
- ANY PT  $z = (x, y)$  HAS A DIFFERENT VALUE ON A DIFFERENT BRANCH.  $\Rightarrow$  MULTIVALUED.
- WE CUT ON NEG. REAL AXIS. WE CAN CUT ANYWHERE IT IS CONVENIENT AND DEFINE DIFFERENT BRANCHES
- ex. CUT AT  $\theta = \dots, -5\pi/2, -\pi/2, 3\pi/2, \dots$
- $\omega$  BRANCHES ON  $\theta \in \dots, (-5\pi/2, -\pi/2), (-\pi/2, 3\pi/2), \dots$
- THE PRINCIPAL BRANCH IS  $\theta \in (-\pi, \pi)$