4. $M = \mathbb{C}^2 - \{0\}$. $\Rightarrow$ By Hartog's theorem, $\mathcal{O}(\mathbb{C}^2-\{0\}) = \mathcal{O}(\mathbb{C}^2)$
$\mathcal{U}_1 = \{z_1 \neq 0\}$ $\quad U_2 = \{z_2 \neq 0\}$.
$\Rightarrow$ $\{U_1, U_2\}$ is acyclic since $U_1 \cong U_2 \cong \mathbb{C} \times \mathbb{C}^*$ & $U_1 \cap U_2 \cong \mathbb{C}^* \times \mathbb{C}^*$.

$C^1(\{U_1, U_2\}, \mathcal{O}) = \mathcal{O}(U_1 \cap U_2)$ consists of Laurent series

$$f(z_1, z_2) = \sum_{m,n=-\infty}^{\infty} a_{mn} z_1^m z_2^n \ ;$$ $\mathcal{O}(U_1)$ consists of series

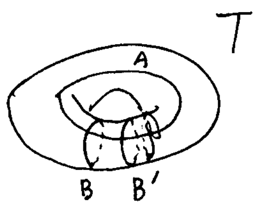
$$f(z_1, z_2) = \sum_{n \geq 0} b_{mn} z_1^m z_2^n$$ $z_1 \neq 0$ z_2 can be 0.

$\mathcal{O}(U_2)$ consists of series. $f(z_1, z_2) = \sum_{m \geq 0} C_{mn} z_1^m z_2^n$.

$\Rightarrow$ $\delta C^0(\{U_1, U_2\}, \mathcal{O}) = \mathcal{O}(U_1) + \mathcal{O}(U_2)$ contains no Laurent series with terms $z_1^m z_2^n$, $m, n < 0$.
$\Rightarrow$ We conclude that $\dim H^1(\mathbb{C}^2 - \{0\}, \mathcal{O}) = \infty$.

4. Topology Of Manifolds.

Intersection of Cycles.



$B \sim B'$ homologous

$B \cap A = \phi \quad B' \cap A = \phi$ $\qquad (A) = \alpha$, $(B) = \beta \in H_1(T, \mathbb{Z})$

The # of points of intersection of cycles representing α & β is indeterminate. What is needed is a way of counting up the points of intersection of two cycles on T such that "extraneous" intersections cancel each other out. $\Rightarrow$ If two cycles A and B on T intersect transversely at a point p, we define