

§ 2007 年

1. Topological space $X = \{z = x + iy \in \mathbb{C} \mid z \neq 0, z \neq 1, z \neq i\}$

Cohomology groups $H^0(X) = ?$ $H^1(X) = ?$

2. Cone $C = \{x^2 + y^2 = z^2\}$, $C \cap \{x - 2y + 3z = 4\}$ is a conic section.

At $(x, y, z) = (-3, 4, 5)$, curvature $K = ?$

3. $P: y = x^2$ is a parabola, $ds = \sqrt{dx^2 + dy^2}$ is the differential of arclength,

curvature integral of the parabola P , $\int_P K ds =$

4. $\frac{y}{x} = \tan z$ is a helicoid. At $(x, y, z) = (1, 1, \frac{\pi}{4})$, $\bar{V} = (1, 1, -1)$ is a tangent vector.

Parallel translate \bar{V} along $\gamma(t) = (t, t, \frac{\pi}{4})$ from $t=1$ to $t=0$, $\bar{V}(t=0) = ?$