1 Variety

Problem 1.1. *(a) Let y be the plane curve $y = x^2$ (i.e., y is the zero set of the polynomial $f = y - x^2$). Show that $A(Y)$ is isomorphic to a polynomial ring in one variable over k.*

(b) Let Z be the plane curve $xy = 1$. Show that $A(Z)$ is not isomorphic to a polynomial ring in one variable over k.

(c) Let f be any irreducible quadratic polynomial in $k[x, y]$, and let W be the conic defined by f. Show that $A(W)$ is isomorphic to $A(Y)$ or $A(Z)$. Which one is it when?*

Solution. This is a new solution ◀

Problem 1.2. ***The Twisted Cubic Curve.*** *Let $Y \subset \mathbb{A}^3$ be the set $Y = \{(t, t^2, t^3) | t \in\}$. Show that Y is an affine variety of dimension 1. Find generators for the ideal $I(Y)$. Show that $A(Y)$ is isomorphic to a polynomial ring in one variable over k. We say that Y is given by the **parametric representation** $x = t, y = t^2, z = t^3$.*

Solution. ◀

2 Projective Varieties

Problem 2.1. *This is a problem*

Solution. This is a new solution ◀