**Mathematisches Institut**
**der Universität München**
**Prof. Dr. B. Pareigis**

**SS 2002**
**Set 2**

# Problem set for Quantum Groups and Noncommutative Geometry

(5) Let $\mathcal{X}$ denote the plane curve $y = x^2$. Then $\mathcal{X}$ is isomorphic to the affine line.

(6) * Let $\mathbb{K}$ be an algebraically closed field. Let $p$ be an irreducible square polynomial in $\mathbb{K}[x, y]$. Let $\mathcal{Z}$ be the conic section defined by $p$ with the affine algebra $\mathbb{K}[x, y]/(p)$. Show that $\mathcal{Z}$ is naturally isomorphic either to $\mathcal{X}$ or to $\mathcal{U}$ from problems (3) resp. (5).

(7) Let $\mathcal{X}$ be an affine scheme with affine algebra

$$A = \mathbb{K}[x_1, \ldots, x_n]/(p_1, \ldots, p_m).$$

Define "coordinate functions" $q_i : \mathcal{X}(B) \longrightarrow B$ which describe the coordinates of $B$-points and identify these coordinate functions with elements of $A$.

(8) Let $S_3$ be the symmetric group and $A := \mathbb{K}[S_3]$ be the group algebra on $S_3$. Describe the points of $\mathcal{X}(B) = \mathbb{K}\text{-}\mathcal{A}lg(A, B)$ as a subspace of $\mathbb{A}^2(B)$. What is the commutative part $\mathcal{X}_c(B)$ of $\mathcal{X}$ and what is the affine algebra of $\mathcal{X}_c$?

Due date: Tuesday, 30.04.2002, 16:15 in Lecture Hall E41