

## Algebraische Kurven

### Übungsaufgaben zum 7. Tutorium am 26.06.2019

#### Aufgabe 25.

Let  $C \subset \mathbb{P}^2$  be a smooth projective plane curve. Let  $P \in C$  be a point, with local parameter  $t \in \mathcal{O}_{C,P}$ . Let  $0 \neq f \in \mathcal{O}_{C,P} \subset k(C)$  be a rational function on  $C$ , which is regular in  $P$ , and consider its differential  $df \in \Omega_C = \Omega_{k(C)}$ . Show that there exists a regular function  $g \in \mathcal{O}_{C,P}$  such that

$$df = g dt.$$

#### Aufgabe 26.

Let  $C \subset \mathbb{P}^2$  be the smooth projective plane cubic given by  $C := V(Y^2Z - X^3 + XZ^2)$ . Show that for its canonical divisor holds

$$K_C \sim 0.$$

Hint: use the rational function  $f := \frac{X}{Z} \in k(C)$ , and compute the divisor associated to  $df$ .

**Abgabe der Lösungen zu Aufgaben 25 und 26 am 26.06.2019 in der Übung.**