TECHNISCHE UNIVERSITÄT
KAISERSLAUTERN

Department of Mathematics
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6-th Exercise Sheet in „Computer Algebra“

Deadline: Thursday, 01 December 2011, 10.00 h

Exercise 1. Let $A \subset B$ be rings. Show that $C := \{b \in B \mid b \text{ is integral over } A\}$, is a subring of B.

HINT: Consider $A[b_1, b_2]$ to show that $b_1 - b_2,\ b_1 b_2 \in C$.

Exercise 2. Let $B = A[b_1, \ldots, b_n]$ be a finite extension and $A \subset K$ where K is an algebraically closed field. Prove that there exists an extension $\lambda : B \to K$.

Exercise 3. Let $x_1(t), \ldots, x_n(t) \in K[t]$ such that $A = K[x_1(t), \ldots, x_n(t)] \subset K[t]$ is finite and $K\big(x_1(t), \ldots, x_n(t)\big) = K(t)$. Prove that $K[t]$ is the normalization of A.

Exercise 4. Add the Product Criterion (see Exercise 3 on Sheet 2) to your SINGULAR procedure `standard` such that your algorithm takes an optional parameter with which you can switch this criterion on and off.