

## Commutative Algebra

Winter Semester 2016 - Problem Set 10

Due January 20, 2017, 1 p.m.

**Problem 1:** Give an example of the following:  $R$  a noetherian ring,  $f \in R \setminus R^{\text{reg}}$  and  $\mathfrak{p} \in \text{Spec } R$  minimal with  $f \in \mathfrak{p}$  and  $\text{ht}(\mathfrak{p}) = 1$ .

**Problem 2:** Let  $R$  be a ring and  $\mathfrak{p} \in \text{Spec}(R)$ . Show that  $\mathfrak{p}^{(n)}$  is the smallest  $\mathfrak{p}$ -primary ideal containing  $\mathfrak{p}^n$

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Commercial break

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Ihr kennt „Schlag den Raab“? Dann kennt ihr auch „Schlag den Prof“ und wollt das am 23.01. alle live miterleben. Kommt um 19:00 Uhr in 46-210 und werdet Teil der großen Show!

Euer „Schlag den Prof“-Team der Fachschaft Mathematik

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End of commercial break

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**Problem 3:** Let  $R$  be a noetherian local ring,  $M$  a finitely generated  $R$ -module, and  $x_1, \dots, x_n$  an  $M$ -sequence. Show that every permutation of  $x_1, \dots, x_n$  is an  $M$ -sequence.

**Problem 4:** Let  $R$  be a regular local ring, and  $I \trianglelefteq R$  an ideal. Then  $R/I$  is regular if and only if  $I$  is generated by a subset of a regular system of parameters.