Math 5320, 2/21/18 Name:

Worksheet 16

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1. Let R be an integral domain and $p \in R$ a prime element. Show that the principal ideal (p) is a prime ideal.

2. We showed before that in a PID, an ideal is maximal if and only if it is principally generated by an irreducible element. However, this is not true more generally, and in particular the analogue of problem (1) is false: Find an example of an integral domain R and an irreducible element $q \in R$ so that (q) is not maximal.

3. In the last lecture, we proved that in a PID, irreducible elements are prime. We proved this by using the existence of Bézout's identity in PID's. How could we prove it another way using problem (1) and the statement from the beginning of problem (2)?

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