

Extra Credit 1

Math 456

February 19, 2007

Be careful in Problem 1(a) in the Midterm I:

1. Let R be a ring and I be an ideal of R .

- (a) Prove that if J is an ideal of R containing I , then $\bar{J} \stackrel{\text{def}}{=} \{\bar{a} \in R/I : a \in J\}$ is an ideal of R/I .
- (b) Prove that if \bar{J}' is an ideal of R/I , then $J' \stackrel{\text{def}}{=} \{a \in R : \bar{a} \in \bar{J}'\}$ is an ideal of R containing I .

If, in your solution you say: “Let $\bar{a} \in \bar{J}$. Then, by definition of \bar{J} , we have that $a \in J$.”, you will need to justify it (or say something else)!!! It does *not* follow from the definition! (Why not?)

In fact, for extra credit, give an example where I and J are ideals of a commutative ring R with unity, in which there is an $\bar{a} \in \bar{J} \stackrel{\text{def}}{=} \{\bar{a} \in R/I : a \in J\}$, with $a \notin J$.