## MATH 101: GRADUATE LINEAR ALGEBRA DAILY HOMEWORK #20

**Problem 20.1.** Let  $R = \mathbb{R}[x, y, z]/(xy - z^2)$ . Let  $P = (\overline{x}, \overline{z})$  be the ideal generated by the images of x, z in R.

- (a) Show that P is prime.
- (b) Let  $R_P$  be the localization of R at P. Prove that  $P^2R_P \cap R = (\overline{x})$ . Note that this ideal is *bigger* than  $P^2$ .

Date: Assigned Wednesday, 25 October 2017; due Friday, 27 October 2017.