

## Algebraic geometry II: HW 3

Be sure to justify all answers fully. You may assume any results I stated in class. No collaboration is allowed on the solutions; however, you are free to talk to anyone about what I did in class (e.g., definitions, results, etc.). In particular, you are not allowed to look at someone else's homework.

Let  $X$  denote the affine curve  $y = x^2$  over an algebraically closed field  $k$ , and let  $P = (0, 0) \in X$ .

1. Show that  $X$  is regular in codimension one.
2. Show that the maximal ideal of the local ring at  $P$  is principal, and find a generator for it.
3. Find the order of vanishing of  $x + y \in K(X)$  at  $P$ .