

## MATH 101B: HOMEWORK

### 5. HOMEWORK 05

The following problems are due Thursday (3/8/7). The strict deadline is 1:30pm Friday.

- (1) (Problems #3 on page 374) If  $L \subseteq E$  are finitely generated field extension of  $K$  then show that the transcendence degree of  $E$  over  $K$  is equal to the product of the transcendence degree of  $E$  over  $L$  and the transcendence degree of  $L$  over  $K$ .
- (2) Let  $R = K[X, Y]/(f)$  where  $f(X, Y) = (X - a)Y^2 - (X - b)$  for some  $a \neq b \in K$ . Find a transcendental element  $Z$  of  $R$  so that  $R$  is integral over  $K[Z]$ . [Use the proof of Noether Normalization.]