

## MATH 101B: HOMEWORK

### 8. HOMEWORK 08

The following problems are due Thursday (4/19/7). The strict deadline is 1:30pm Friday.

- (1) Let  $K$  be any field, let  $G$  be any finite group. Let  $V = K$  be the trivial representation of  $G$ . Let  $E = K[G]$  be the group ring considered as a representation (this is called the “regular representation”) Find all  $G$ -homomorphisms

$$f : V \rightarrow E$$

(and show that you have a complete list).

- (2) If  $K$  is the field with two elements and  $G$  is the group with two elements then show that  $K[G]$  is not semisimple. [Using your answer to question 1, show that you have a short exact sequence  $0 \rightarrow V \rightarrow E \rightarrow V \rightarrow 0$  which does not split.]