MATH 101B: HOMEWORK

8. Homework 08

The following problems are due Thursday (4/19/7). The strict dead-
line 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.]

Date: April 15, 2007.