

PRINT Your Name: \_\_\_\_\_

Get your course grade from **TIPS/VIP** late on Monday or later; or e-mail your e-mail address to me and I will e-mail your grade to you.

There are 20 problems on 8 pages. The exam is worth a total of 100 points. Each problem is worth 5 points.

1. DEFINE *group isomorphism*.

The function  $\phi: G \rightarrow G'$  from the group  $G$  to the group  $G'$  is a group isomorphism if  $\phi(xy) = \phi(x)\phi(y)$  for all  $x$  and  $y$  in  $G$  and  $\phi$  is one-to-one and onto.

2. DEFINE *generator*. If  $G$  is a group and  $g$  is an element of  $G$  with the property that every element of  $G$  is equal to some power of  $g$ , then  $g$  is a generator of  $G$ .

3. DEFINE *centralizer*. Let  $a$  be a fixed element of the group  $G$ . The centralizer of  $a$  in  $G$  is the set of all elements of  $G$  which commute with  $a$ .