

The marks for the midterm have been posted to blackboard. The average was 64%, which is a little disappointing considering how straightforward the test was. Some comments:

1) If you're going to write out a set, you need to use the  $\{\}$  braces, not  $(,)$  or  $[,]$ .  $\{a,b,c,d\}$  is a set.  $(a,b,c,d)$  is a \*sequence\*, which is a different thing.  $[a,b,c,d]$  isn't a thing (maybe some sort of generalised Lie bracket)

2) Some people seem confused as to what a "definition" is. When you read a definition in your textbook, it's to explain to you what something is, considering you've never seen it before. So, for example, the following is an insufficient definition:

"A group  $G$  is cyclic if there exists an element  $g$  in  $G$  such that  $G=\langle g \rangle$ "

Because you haven't said what " $\langle g \rangle$ " means. Here is an example of a proper definition:

"A group  $G$  is cyclic if there exists a  $g$  in  $G$  such that for every  $h$  in  $G$ , one can write  $h = g^m$  for some  $m$  in  $\mathbb{Z}$ "

3) A lot of people don't seem to understand the concept of "ONTO". If a map  $f: G \rightarrow H$  is ONTO, this means that for all  $h$  in  $H$ , there exists a  $g$  in  $G$  such that  $f(g)=h$ . In other words, every element of the codomain is "hit" by the map. i.e.: the range of  $f$  is equal to the codomain.

For the  $f: G \rightarrow G$ ,  $f(g)=g^{-1}$  question, this is not sufficient:

"Since  $g^{-1}$  is in  $G$ , there is a  $g$  such that  $f(g) = g^{-1}$ , so  $f$  is onto"

This is the way to show it:

"Let  $g$  in  $G$ . What to find an  $x$  in  $G$  such that  $f(x) = g$ . This would be true if and only if  $x^{-1}=g$ , iff  $x = g^{-1}$ . So for all  $g$  in  $G$ , the element  $g^{-1}$  maps to  $g$  via  $f$ ."

4) Examples are not proofs. If you're asked to show any two groups of order 2 are isomorphic, you can't just pick any two single ones you want and show it. This would be like me saying to you "Prove all shirts in the world are blue", and you say "This shirt I'm wearing is blue, therefore all shirts are blue".

5) For cyclic  $G$  isomorphic to  $\mathbb{Z}_n$  question, some people defined  $G = \langle a \rangle$ , and then defined their map to be " $f(g) = \log_a(g)$ " for  $g$  in  $G$ . Strictly speaking, this is nonsense. "Logarithm" isn't a function on groups, so this doesn't make sense. Less strictly speaking, this is only 90% nonsense. What people generally meant was  $f(a^{k \bmod n}) = k \bmod n$ . i.e.: just the exponent. That's the right idea, but elements of general groups aren't numbers, so you can't apply calculus-esque functions to them.

6) If you got 0/2 on the very last question, you need to consider very carefully what you must do to pass this course. That question was exceedingly easy, given as a "freebie". If you had trouble with that, you will definitely experience a lot more trouble before the course is done.