Math 71

Homework Assignment 20 October 1999

- p. 90: 41
- p. 102: 3 [Hint: Use the Second Isomorphism Theorem], and do not assume any of the groups are finite.
- New Proof of Second Isomorphism Theorem (Theorem 18, p. 98): Let G be a group with A, B subgroups of G and with $B \trianglelefteq G$. Then $A \cap B \trianglelefteq A$ and $AB/B \cong A/A \cap B$.

  Be sure to verify that AB is a subgroup of G, $B \trianglelefteq AB$, and $A \cap B \trianglelefteq A$.

  Then proceed with a proof by justifying that $\varphi : A \to AB/B$ induced by a natural composition of maps $A \to AB \to AB/B$ ($a \mapsto a \cdot 1 \mapsto aB$) is a surjective homomorphism. Computing the kernel of φ and applying the first isomorphism theorem should yield the result.