

## MODERN ALGEBRA 1: HOMEWORK 9

- (1) Let  $G$  be a simple group. Prove that a homomorphism  $\phi: G \rightarrow H$  is either injective or trivial (i.e.  $\phi(g) = e$  for all  $g \in G$ ).
- (2) Prove that if  $n \geq 5$ , then the only normal subgroups of  $S_n$  are  $\{e\}$ ,  $A_n$ , and  $S_n$ .
- (3) Chapter 7: 5.3
- (4) Chapter 7: 5.6
- (5) Chapter 7: 5.8
- (6) Chapter 7: M.4
- (7) Chapter 7: M.7