

## Algebra 3 (2004-05) – Assignment 5

Instructor: Dr. Eyal Goren

Submit by Monday, October 18, 17:00 by mail-box on 10<sup>th</sup> floor.

- 1) Prove that for  $n \geq 5$ ,  $A_n$  is the only non-trivial normal subgroup of  $S_n$ .
- 2) Prove that for  $n \geq 5$  the commutator subgroup of  $S_n$  is  $A_n$ .
- 3) Let  $n \geq 5$ . Prove that  $A_n$  is generated by the 3-cycles (namely, permutations of the form  $(i\ j\ k)$ , where  $i, j, k$  are distinct). Prove that  $A_n$  is generated by 5-cycles too.