HOMEWORK III

1. Show that, for $n \neq 4$ and 2, $A_n$ is the only proper normal subgroup of $S_n$.

2. a) Show that, for $n \neq 2$, $A_n$ is generated by 3-cycles.

   b) Prove that, for $n \geq 5$, $S_n$ is not solvable.

   **Hint:** Express every 3-cycle as $xxy^{-1}y^{-1}$ where $x$ and $y$ are 3-cycles.