Exercise 1. Determine all of the Sylow 3-subgroups of S_5.

Exercise 2. Show that there is no simple group of order 200 (Hint: Look for a normal Sylow p-subgroup).

Exercise 3. Let G be a group of order $p^n q$ for some primes $p > q$. Show that G contains a unique normal subgroup of index q.

Exercise 4. Show that every group of order $p^2 q$ for distinct primes p, q is solvable.

Exercise 5. Let G be a group, $K \leq G$, and $H \trianglelefteq G$. Show that if H and K are solvable, then HK is solvable as well.

Exercise 6. Use the Sylow theorems to show that every group of order 72 is solvable.