Math 100A: Abstract Algebra I (UC San Diego, fall 2017)
Homework 8: due Wednesday, December 6 at 5pm

For this assignment, you need the definition of a Sylow $p$-subgroup (section 7.7), but you do not need the statements or proofs of the Sylow theorems.

(1) Artin, Chapter 6, exercise M.8. This depends on Burnside’s formula (Exercise M.7), but you do not have to turn in that exercise.
(2) Artin, Chapter 7, exercise 2.3.
(3) Artin, Chapter 7, exercise 2.9.
(4) Artin, Chapter 7, exercise 3.1.
(5) Artin, Chapter 7, exercise 5.2.
(6) Artin, Chapter 7, exercise 5.7. (You may want to use Theorem 7.5.4.)
(7) Artin, Chapter 7, exercise 5.12.
(8) Artin, Chapter 7, exercise 7.5. (Note: the problem is asking you to find one Sylow subgroup for each group, not all of them.)
(9) Find a Sylow 2-subgroup of $S_4$ and $S_8$. (Optional challenge: find a Sylow $p$-subgroup of $S_n$ for every $p$ and $n$.)