Take Home Midterm

TMath 402

Winter 2024

This section is to be taken home, completed, and turned in through Canvas by 8:00pm Wednesday Jan 31st. There is no time limit and you do not need to type up your solutions to get full marks although the answers should be well edited and readable.

You may discuss this problem with anyone else from the class and use the class resources posted on Canvas. You may not consult anyone or any resource that is not affiliated with the class such as tutors, websites, or other textbooks.

Consider the subgroup H in S_9 with the two generators a and b defined below in cyclic notation and Chris's notation:

$a = (1563) = [5, 2, 1, 4, 6, 3, 7, 8, 9]$

$b = (28) = [1, 8, 3, 4, 5, 6, 7, 2, 9]$

1. [2] Is H abelian? Provide justification.
2. [3] Provide a Cayley Graph for the subgroup H. You do not need to use the generators given above if you do not want but please carefully identify any elements!
3. [3] Create the subgroup lattice for H.
4. [2] Identify what group in the textbook the subgroup H is isomorphic to. Provide justification (but not a formal proof since "isomorphic" hasn't been defined yet!)