

Math 371
Spring 2019
Practice exam
02/19/2019

Name: _____

Time Limit: 80 Minutes

ID _____

“My signature below certifies that I have complied with the University of Pennsylvania’s Code of Academic Integrity in completing this”

Signature _____

This exam contains 11 pages (including this cover page) and 10 questions.
Total of points is 100.

- Check your exam to make sure all 11 pages are present.
- You may use writing implements and a single handwritten sheet of 8.5”x11” paper.
- NO CALCULATORS.
- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Good luck!

Grade Table (for teacher use only)

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
Total:	100	

1. (10 points) State the definition of an operation of group G on a set S . State the property for the operation to be transitive.

2. (10 points) Write the element $(123)(234) \in S_4$ as product of disjoint cycles.

3. (10 points) Find the Sylow 2-subgroup of S_4 .

4. (10 points) Find all the normal subgroups of D_6 .

5. (10 points) Classify all finite groups of order 45.

6. (10 points) Classify all finite groups of order 10.

7. (10 points) Prove that a group of order 200 is not a simple group.

8. (10 points) Prove that $SO(2)$ is isomorphic to \mathbb{R}/\mathbb{Z} .

9. (10 points) The operation of finite group G on set S is transitive and H is a normal subgroup of G . Prove that the orbits under the operation of H on S have the same number of elements.

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10. (10 points) Let p be a prime number. Prove the center $Z(G)$ of a nonabelian group G of order p^3 must have order p .