NAME: **PID:** **Section:**

PRACTICE MIDTERM 2 MATH 103A Winter 2021

1. You have 50 minutes. **No** calculators, phones, books and notes allowed, except for one cheat sheet.
2. Write your solutions in the provided spaces. Show your work and justify your answers.

1. Let $\alpha = (12345)(14)$. Write α^{1802} as a product of disjoint cycles.

2. How many elements of order 10 are in S_7?

3. Are the groups $U(5)$ and $U(10)$ isomorphic? Prove or disprove it.

4. Write down the cosets of the subgroup $\{1, 9\}$ in $U(20)$.

5. Let α be an automorphism of $\mathbb{Z}$.
   (a) Is it possible that $\alpha(1) = 2$? Either prove that there is an automorphism with this property or give a reason why it can not exist.

   (b) Determine all possible automorphisms of $\mathbb{Z}$.