MATH 243 - 01 Mathematical Structures **Quiz 9** **April 28, 2023**

Your Name:

Duration of the Quiz is 20 minutes. There are two problems, worth 20 points, and an extra credit problem, worth 2 points. Show all your work for full credit. Books, notes etc. are prohibited. Calculators are NOT permitted.

1. A chess master who has 11 weeks to prepare for a tournament decides to play at least one game every day but, to avoid tiring himself, he decides not to play more than 12 games during any calendar week. Show that there exists a succession of (consecutive) days during which the chess master will have played exactly 21 games.

   Hint: Let a_j be the number of games played on or before the jth day. Moreover, $a_1 \geq 1$ and $a_{77} \leq 12 \times 11 = 132$.

2. State and prove the Pigeonhole Principle.

Extra Credit Problem From the integers $1, 2, ..., 200$, we choose 101 integers. Show that, among the integers chosen, there are two such that one of them is divisible by the other.