

## Homework Assignment #3

### Due Date, Wednesday 10/4

1. Let  $S$  be a subset of  $\{1, \dots, 100\}$  with  $|S| = 52$ . Prove that there are two numbers in  $S$  that add to 100. Given an example of a set  $S$  of 51 numbers with no pair adding to 100.
2. An beginning chess player decides to go on a 77-day chess-practicing spree in order to learn the game. He will play at least one game per day and will play 131 games in total. Prove that there is a succession of days in which he will play exactly 22 games in total.
3. Consider three sets  $A$ ,  $B$ , and  $C$  such that

$$|A \cup B \cup C| = 21 \quad |A| = 9 \quad |B| = 9 \quad |C| = 15 \quad |A \cap B| = 3 \quad |A \cap C| = 7 \quad |B \cap C| = 6$$

Why is this impossible?