1.(3 points) Prove: If A and B are subsets of Ω, then

$$P(A \cup B) = P(A) + P(B) - P(A \cap B).$$

(Note: This exercise is proven in our textbook, but the proof is written poorly. Please write the proof in your own words and make sure that you justify every statement that you make. You will receive NO CREDIT if you simply copy the proof from the book.)

2.(2 points) What do you think the formula should be for $P(A \cup B \cup C)$ where A, B, C are subsets of Ω (not necessarily pairwise disjoint)? Explain your answer using a Venn diagram.

Bonus (+2 points) Prove: If we remove two opposite corners from a chessboard, the board cannot be covered by dominoes (each domino covers two neighboring squares on the chessboard).

(Hint: Your answer should be clear and convincing with no cases to distinguish. If done correctly, your answer should take no more than 2 or 3 sentences.)