Recitation 1

1. A four-sided die is rolled repeatedly, until the first time (if ever) that an even number is obtained. What is the sample space for this experiment?

2. A parking lot consists of a single row containing n parking spaces ($n \geq 2$). Mary arrives when all spaces are free. Tom is the next person to arrive. Each person makes an equally likely choice among all available spaces at the time of arrival. Describe the sample space. Obtain $P(A)$, the probability the parking spaces selected by Mary and Tom are at most 2 spaces apart (that is, at most 1 empty space between them).

3. **Practice Problem:** Let A and B be two events. Use the axioms of probability to prove the following:

   (a) If event A is a subset of event B, then $P(A) \leq P(B)$.

   (b) $P(A \cup B) \leq P(A) + P(B)$.

   (c) $P(A \cap B) \geq P(A) + P(B) - 1$

   (d) $P(A \text{ or } B, \text{ but not both}) = P(A) + P(B) - 2P(A \cap B)$

   Note: Your proof should be a step-by-step derivation, where each step appeals to an axiom or a logical rule.