1. An experiment is any process that produces an observation or outcome.
2. A random experiment is an experiment whose outcome is not predictable with certainty.
3. A sample space (denoted Ω by or S) is the collection of all basic outcomes. The possible outcomes that are considered here should be mutually exclusive (only one can occur) and exhaustive (one must occur)
4. An event is a subset of the sample space. We say, an event has occurred if the outcome is contained in the subset.
5. For any two events E and F, we define the new event E U F called the union of events E and F, to consist of all outcomes that are in E or in F or in both E and F. Thus, event E U F will occur if either E or F occurs.
6. For any two events E and F, we define the new event E ∩ F called the intersection of events E and F, to consist of all outcomes that are in E and in F. That is, the event E ∩ F will occur if both E and F occurs.
7. We call the event without any outcomes the null event, and designate it as Ø
8. If the intersection of E and F is the null event, then since E and F cannot simultaneously occur, we say that E and F are disjoint, or mutually exclusive.
9. The complement of E, denoted by E_c, consists of all outcomes in the sample space S that are not in E. E_c will occur if and only if E does not occur.
10. The complement of the sample space is the null set, that is S_c = Ø
11. As an example, consider the experiment, where two coins are tossed. Sample space is S = {HH, HT, TH, TT}. Event *head on the first toss* E = {HH, HT}. E_c = {TT, TH} and represents *tail on the first toss*.
12. For any two events E and F, if all of the outcomes in E are also in F, then we say that E is contained in F, or E is a subset of F, and denote it as E ⊂ F
13. Interpretations of probability
    a. Let S be the sample space of a random experiment in which there are n equally likely outcomes, and the event E consists of exactly m of these outcomes, then we say the probability of the event E is m/n and represent it as P(E) = m/n
    b. Relative frequency (Aposteriori or empirical): The probability of an event in an experiment is the proportion (or fraction) of times the event occurs in a very long (theoretically infinite) series of (independent) repetitions of experiment. In other words, if n(E) is the number of times E occurs in n repetitions of the experiment, P(E) = lim(n->∞)n(E)/n
    a. Subjective: The probability of an event is a "best guess" by a person making the statement of the chances that the event will happen. The probability measures an individual's degree of belief in the event.
14. 0 <= P(E) <= 1
15. P(S) = 1, where S denotes the sample space
16. Probability of union of all possible disjoint events from the sample space is equal to sum of the probabilities of the same events. Note here that events should be disjoint or mutually exclusive.
17. $P(E_1 \cup E_2) = P(E_1) + P(E_2)$, if E1 and E2 are mutually exclusive.
18. $P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$, if E1 and E2 aren't mutually exclusive.
19. $P(E_c) = 1 - P(E)$. In this case, E and Ec are mutually exclusive. Specifically, $E \cup E_c = S$
20. P(Ø) = 0