Brief Notes #1
Events and Their Probability

• Definitions

Experiment: a set of conditions under which some variable is observed
Outcome of an experiment: the result of the observation (a sample point)
Sample Space, S: collection of all possible outcomes (sample points) of an experiment
Event: a collection of sample points

• Operations with events

1. Complementation
   \[ A^c \]

2. Intersection
   \[ A \cap B \]

3. Union
   \[ A \cup B \]

• Properties of events

1. Mutual Exclusiveness - intersection of events is the null set (\( A_i \cap A_j = \emptyset \), for all \( i \neq j \))
2. Collective Exhaustiveness (C.E.) - union of events is sample space (\( A_1 \cup A_2 \cup \ldots \cup A_n = S \))
3. If the events \( \{A_1, A_2, \ldots, A_n\} \) are both mutually exclusive and collectively exhaustive, they form a partition of the sample space, S.

• Probability of events

• Relative frequency \( f_E \) and limit of relative frequency \( F_E \) of an event \( E \)

\[
f_E = \frac{n_E}{n}
\]

\[
F_E = \lim_{n \to \infty} f_E = \lim_{n \to \infty} \frac{n_E}{n}
\]

• Properties of relative frequency (the same is true for the limit of relative frequency)