# Solving Complex Probability Problems: Takeaways



## Concepts

- The opposite of a set *E* is called its **complement**, and it's denoted as $E^C$.
- For any random experiment either event *E* or $E^C$ will happen, so the event *"E or non-E"* is certain and has a probability of 1:

$$P(E \cup E^C) = P(E) + P(E^C) = 1$$

- The **multiplication rule** says that for two events $E_1$ and $E_2$, the probability that both event $E_1$ **and** $E_2$ happen can be found by multiplying the probability of $E_1$ by the probability of $E_2$:

$$P(E_1 \cap E_2) = P(E_1) \times P(E_2)$$

- The multiplication rule only works for **independent events**. Events that don't influence each other's probability are called independent events.
- When we sample an element from a group and put the element back, we're **sampling with replacement**.
- When we sample an element from a group but don't put it back, we're **sampling without replacement**.

## Resources

- A nice tutorial on independent events
- A brief tutorial that covers types of events