



Econ 2250: Stats for Econ

Fall 2022

[Source for pic stats above.](#)

Announcements

- Homework 4 is due on Thursday (9/22)
- Sample test will be available end of next week
- Class on next Friday will be async (virtual on Loom)

What we will do today?

- Review HW3
- Read through Hw4
- Review AND and OR rules for unconditional prob
- Introduce Conditional Probability

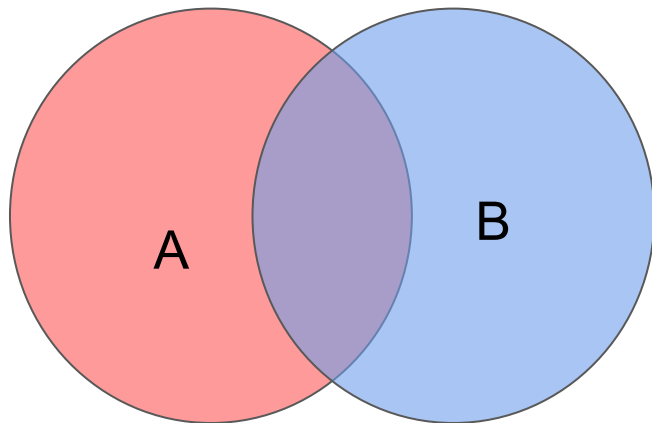
Basic Rules of Probability

1. For any event $P(E) [0,1]$
2. If an event cannot occur $P(E) = 0$
3. If an event is certain to occur $P(E) = 1$
4. The sum of the probability of all outcomes must equal 1.

Likelihood of event

$$P(\text{event}) = \frac{\text{\# of outcomes of event}}{\text{\# of outcomes in } \Omega}$$

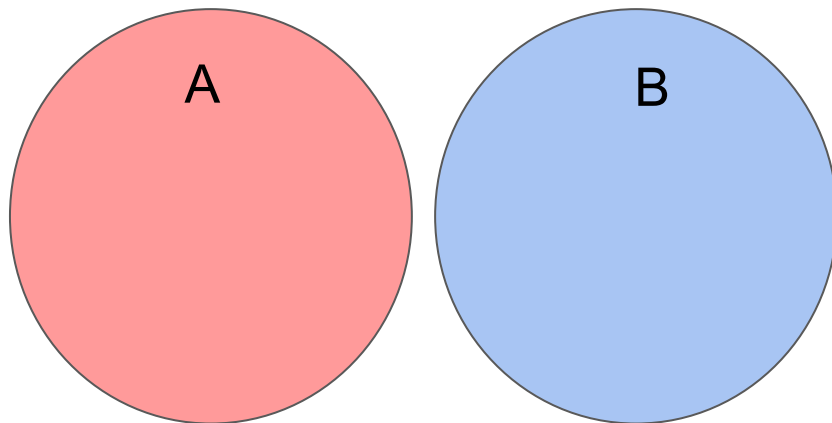
Non-mutually exclusive



$$P(A \cup B)$$

$$P(A) + P(B) - P(A \cap B)$$

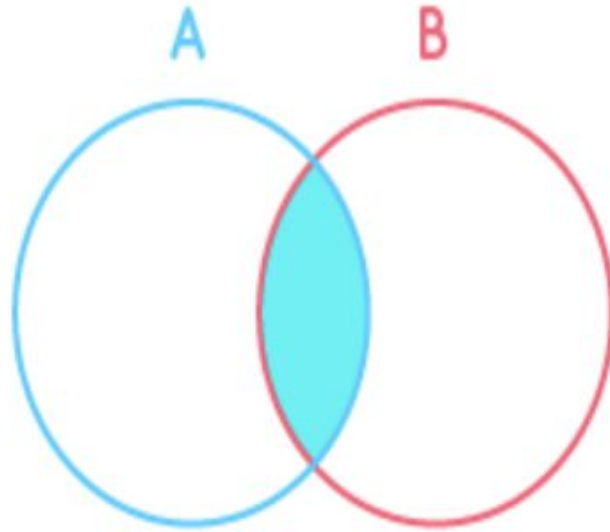
Mutually exclusive



$$P(A \cup B)$$

$$P(A) + P(B)$$

Independent



$$P(A \cap B)$$

$$P(A) * P(B)$$

Summary of probabilities

Event	Probability
A	$P(A) \in [0, 1]$
not A	$P(A^c) = 1 - P(A)$
A or B	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A \cup B) = P(A) + P(B) \quad \text{if A and B are mutually exclusive}$
A and B	$P(A \cap B) = P(A B)P(B) = P(B A)P(A)$ $P(A \cap B) = P(A)P(B) \quad \text{if A and B are independent}$
A given B	$P(A B) = \frac{P(A \cap B)}{P(B)} = \frac{P(B A)P(A)}{P(B)}$

Horse (H) and Elephant (E) Riding

$$P(H) = 0.1$$

$$P(E) = 0.01$$

Independent and Mutually Exclusive

$$P(H \text{ and } E) = ???$$

Horse (H) and Elephant (E) Riding

$$P(H) = 0.1$$

$$P(E) = 0.01$$

Independent and Mutually Exclusive

$$P(H \text{ and } E) = 0.1 * 0.01 = 0.001$$

Horse (H) and Elephant (E) Riding

$$P(H) = 0.1$$

$$P(E) = 0.01$$

Independent and Mutually Exclusive

$$P(H \text{ or } E) = \text{?????}$$

Horse (H) and Elephant (E) Riding

$$P(H) = 0.1$$

$$P(E) = 0.01$$

Independent and Mutually Exclusive

$$P(H \text{ or } E) = 0.1 + 0.01 = 0.11$$

Horse (H) and Elephant (E) Riding

$$P(H) = 0.1$$

$$P(E) = 0.01$$

$$P(H|E) = 0.9$$

$$P(H \text{ and } E) = ???$$

Horse (H) and Elephant (E) Riding

$$P(H) = 0.1$$

$$P(E) = 0.01$$

$$P(H|E) = 0.9$$

$$P(H \text{ and } E) = 0.9 * 0.001 = 0.0009$$

Horse (H) and Elephant (E) Riding

$$P(H) = 0.1$$

$$P(E) = 0.01$$

$$P(H|E) = 0.9$$

$$P(E \text{ and } H) = 0.9 * 0.001 = 0.0009$$

End of class form



(<https://forms.gle/dyVyn1vNan5pTN9x6>)