

# The probability measure $\mathbb{P}$

---



# The probability measure $\mathbf{P}$

---

- ❖ The *probability measure* is a set function,  $A \mapsto \mathbf{P}(A)$ , mapping each event  $A$  into a real number  $\mathbf{P}(A)$  called the probability of  $A$ , and satisfying the following *axioms*:



# The probability measure $\mathbf{P}$

---

- ❖ The *probability measure* is a set function,  $A \mapsto \mathbf{P}(A)$ , mapping each event  $A$  into a real number  $\mathbf{P}(A)$  called the probability of  $A$ , and satisfying the following *axioms*:


🏆 *Positivity*:  $\mathbf{P}(A) \geq 0$  for every event  $A$ .



# The probability measure $\mathbf{P}$

---

- ❖ The *probability measure* is a set function,  $A \mapsto \mathbf{P}(A)$ , mapping each event  $A$  into a real number  $\mathbf{P}(A)$  called the probability of  $A$ , and satisfying the following *axioms*:

-  *Positivity*:  $\mathbf{P}(A) \geq 0$  for every event  $A$ .

-  *Normalisation*:  $\mathbf{P}(\Omega) = 1$ .



# The probability measure $\mathbf{P}$

---

- ❖ The *probability measure* is a set function,  $A \mapsto \mathbf{P}(A)$ , mapping each event  $A$  into a real number  $\mathbf{P}(A)$  called the probability of  $A$ , and satisfying the following *axioms*:

- 🏆 *Positivity*:  $\mathbf{P}(A) \geq 0$  for every event  $A$ .

- 🏆 *Normalisation*:  $\mathbf{P}(\Omega) = 1$ .

- 🏆 *Additivity*: If  $\{A_j, j \geq 1\}$  is any finite or countably infinite collection of pairwise disjoint events,  $A_i \cap A_j = \emptyset$  if  $i \neq j$ , then

$$\mathbf{P}\left(\bigcup_j A_j\right) = \sum_j \mathbf{P}(A_j).$$



# The probability measure $\mathbf{P}$

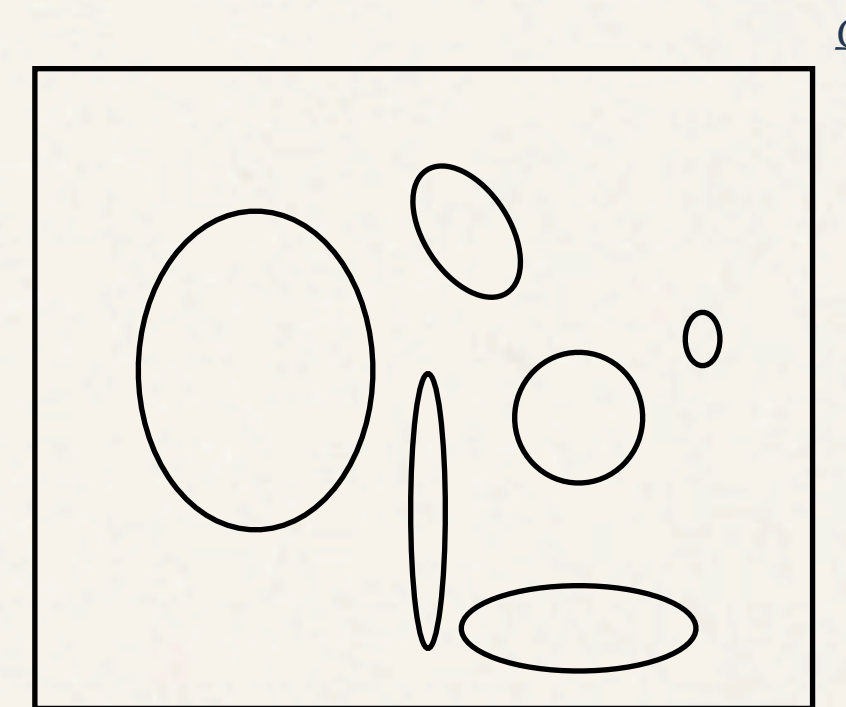
- ❖ The *probability measure* is a set function,  $A \mapsto \mathbf{P}(A)$ , mapping each event  $A$  into a real number  $\mathbf{P}(A)$  called the probability of  $A$ , and satisfying the following *axioms*:

🏆 *Positivity*:  $\mathbf{P}(A) \geq 0$  for every event  $A$ .

🏆 *Normalisation*:  $\mathbf{P}(\Omega) = 1$ .

🏆 *Additivity*: If  $\{A_j, j \geq 1\}$  is any finite or countably infinite collection of pairwise disjoint events,  $A_i \cap A_j = \emptyset$  if  $i \neq j$ , then

$$\mathbf{P}\left(\bigcup_j A_j\right) = \sum_j \mathbf{P}(A_j).$$



$$\mathbf{P}(A_1 \cup A_2) = \mathbf{P}(A_1) + \mathbf{P}(A_2)$$

$$\mathbf{P}(A_1 \cup A_2 \cup \dots \cup A_n) = \mathbf{P}(A_1) + \mathbf{P}(A_2) + \dots + \mathbf{P}(A_n)$$

$$\mathbf{P}(A_1 \cup A_2 \cup \dots \cup A_n \cup \dots) = \mathbf{P}(A_1) + \mathbf{P}(A_2) + \dots + \mathbf{P}(A_n) + \dots$$