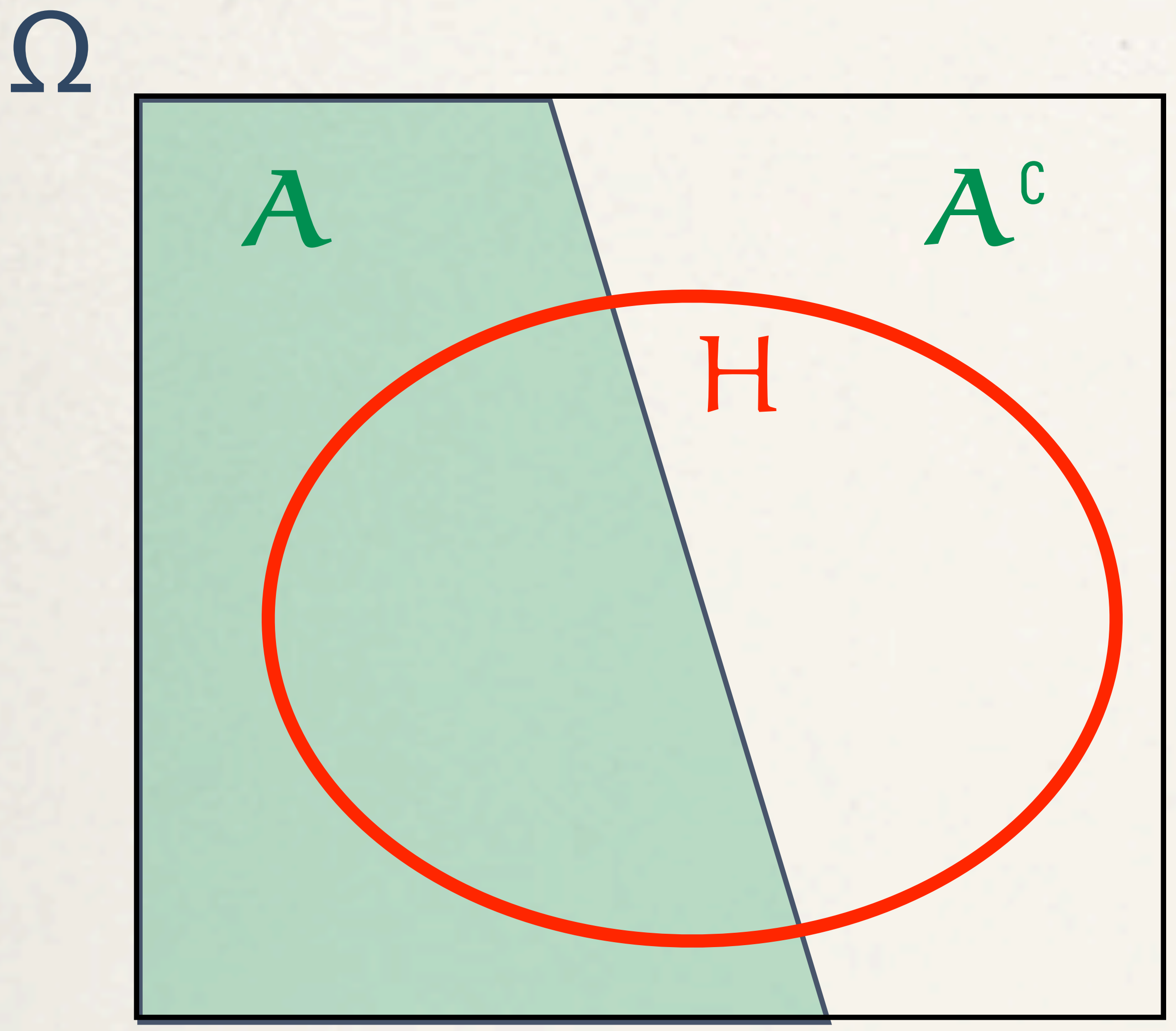
Tableau 8, Part 2

Conditional probability
Additivity; the theorem of total probability

Recap: conditional probability



$\mathbf{P}(A) \neq 0$

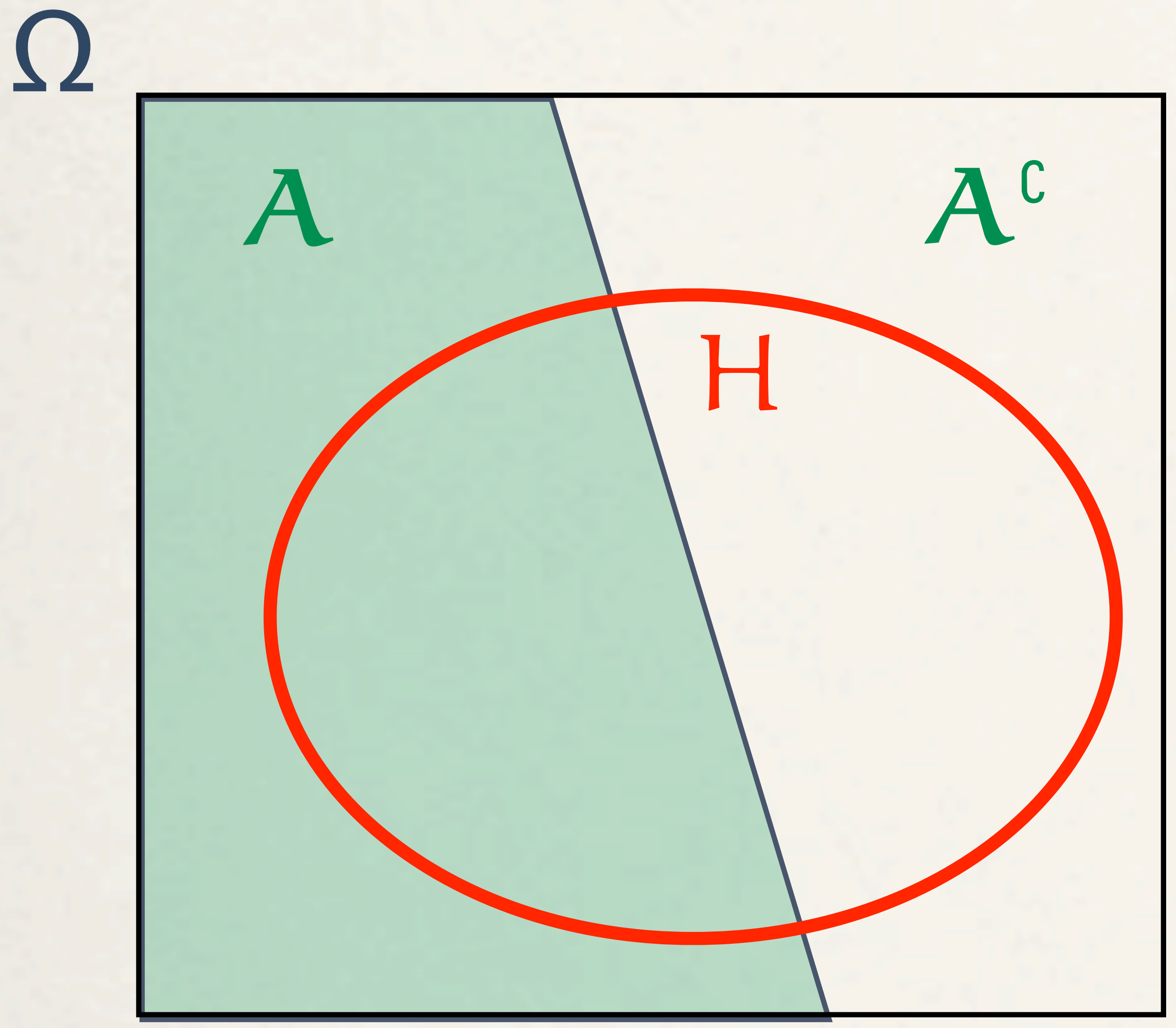
$$\mathbf{P}(H \mid A) = \frac{\mathbf{P}(H \cap A)}{\mathbf{P}(A)}$$

— or —

$$\mathbf{P}(H \cap A) = \mathbf{P}(H \mid A)\,\mathbf{P}(A)$$

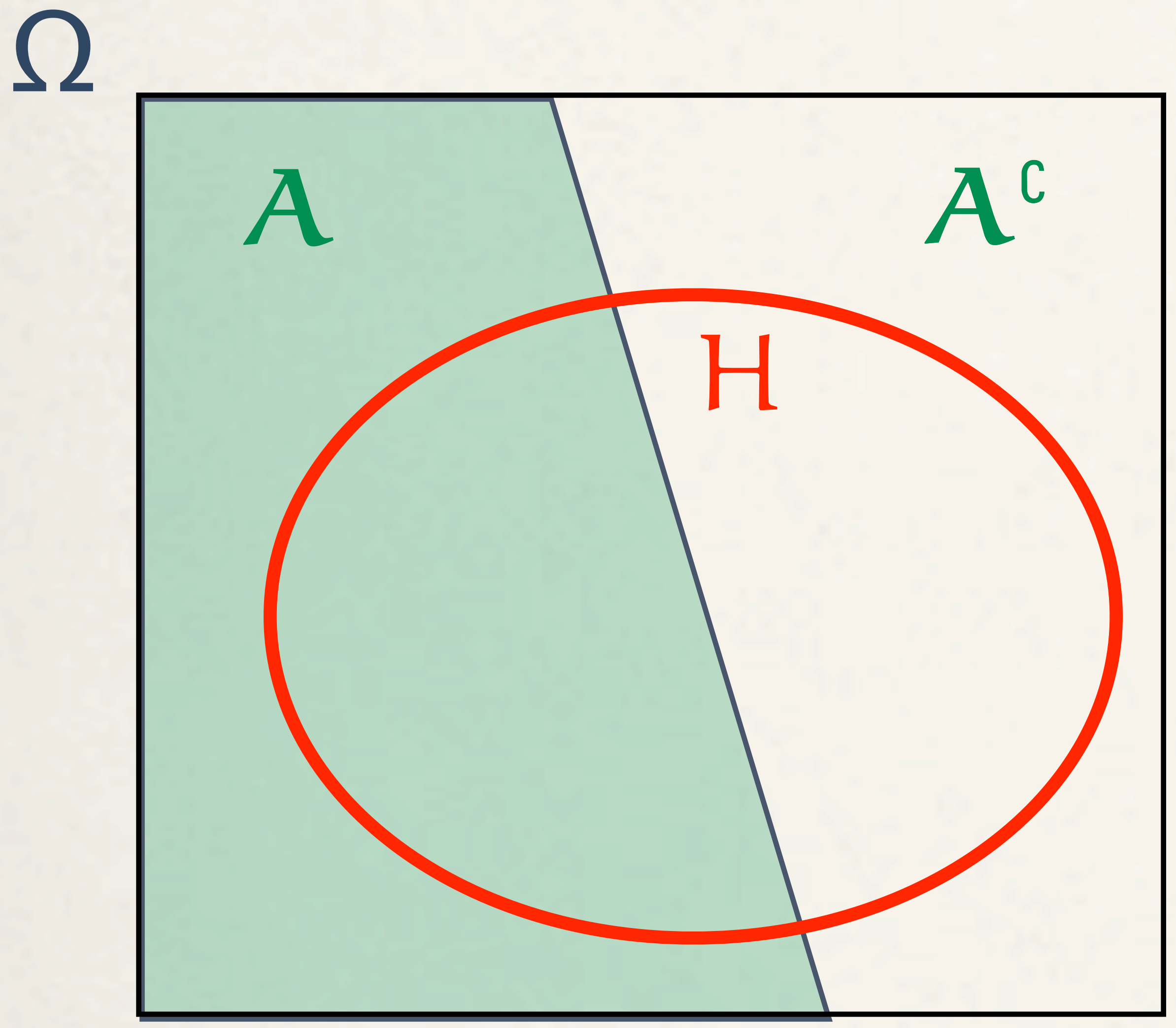
Additivity!

$$\mathbf{P}(H \cap A) = \mathbf{P}(H \mid A)\,\mathbf{P}(A)$$



Additivity!

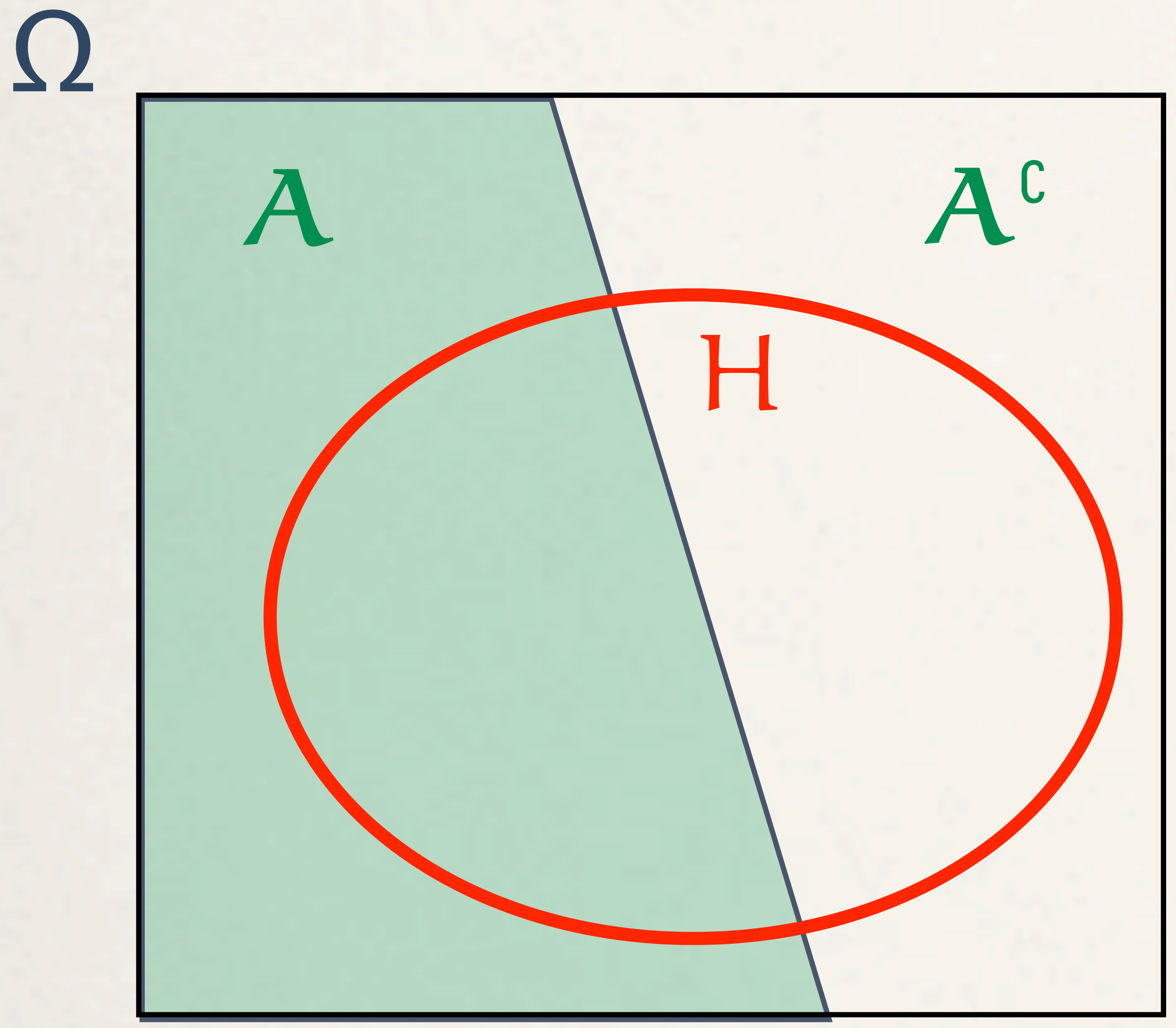
$$\mathbf{P}(H \cap A) = \mathbf{P}(H \mid A)\,\mathbf{P}(A)$$



Additivity!

$$\mathbf{P}(H \cap A) = \mathbf{P}(H \mid A)\,\mathbf{P}(A)$$

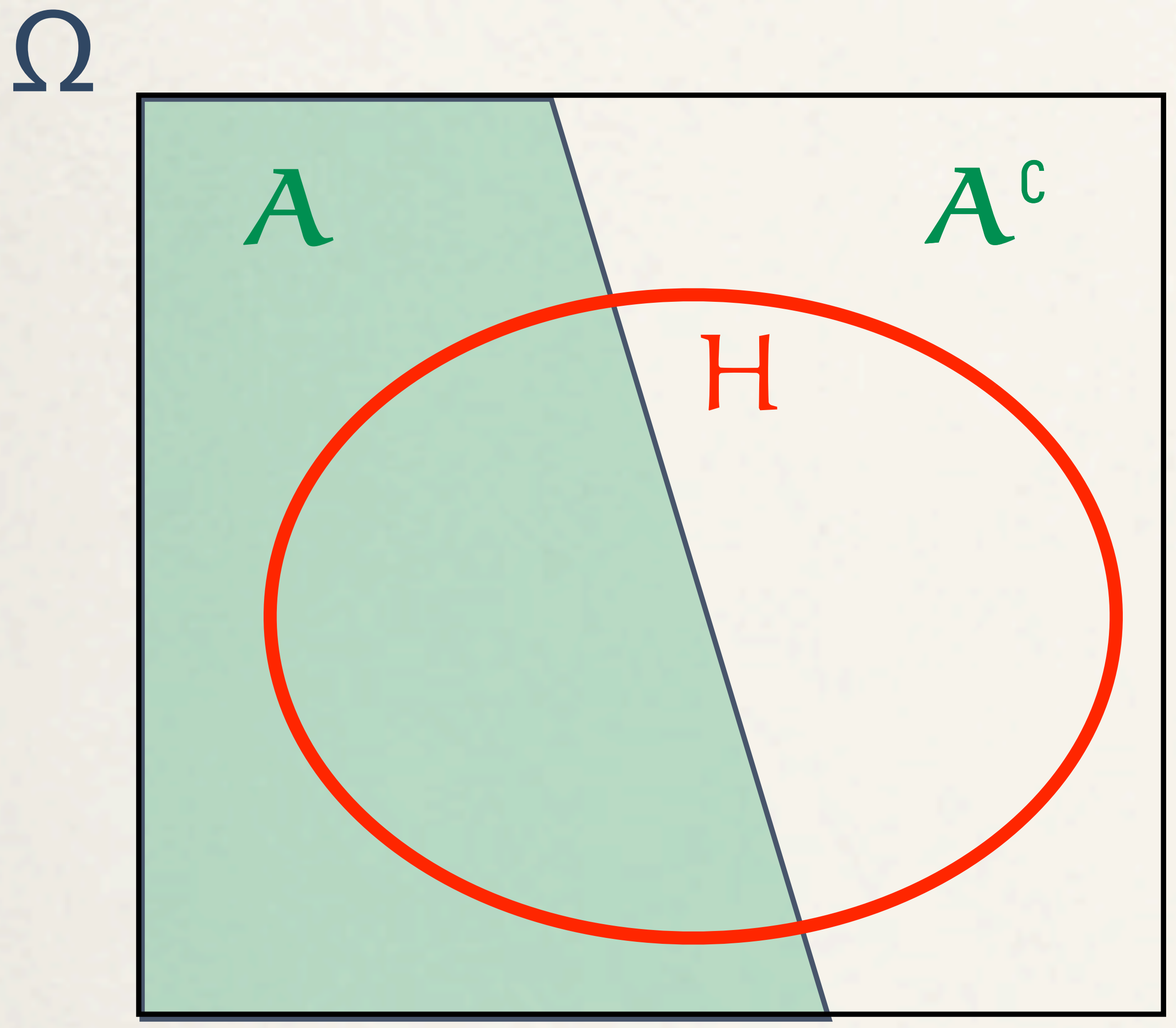
$$H = (H \cap A) \cup (H \cap A^c)$$



Additivity!

$$\mathbf{P}(H \cap A) = \mathbf{P}(H \mid A)\,\mathbf{P}(A)$$

$$H = (H \cap A) \cup (H \cap A^c)$$

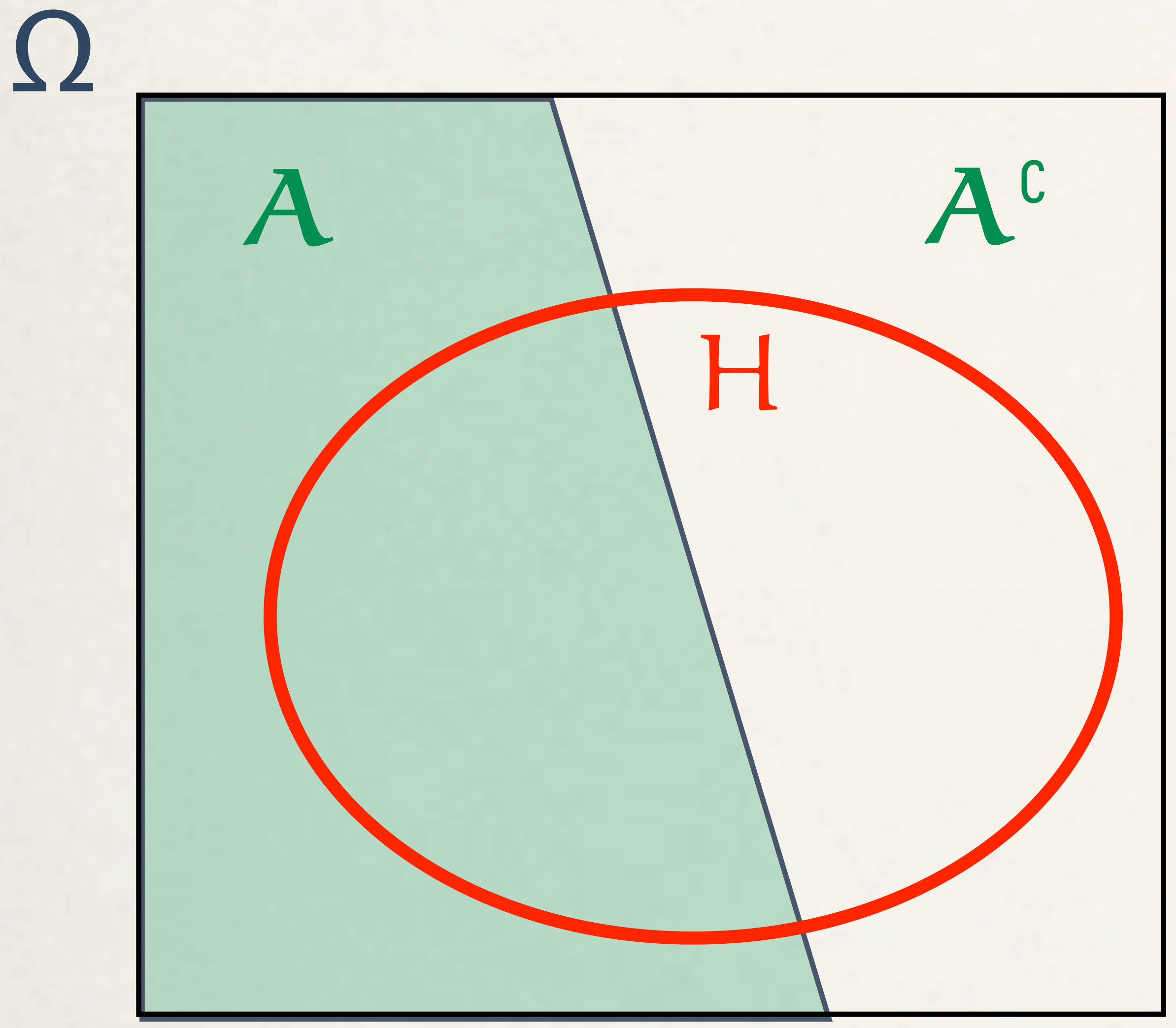


$$\mathbf{P}(H) = \mathbf{P}(H \cap A) + \mathbf{P}(H \cap A^c)$$

Additivity!

$$\mathbf{P}(H \cap A) = \mathbf{P}(H \mid A)\,\mathbf{P}(A)$$

$$H = (H \cap A) \cup (H \cap A^c)$$



$$\mathbf{P}(H) = \mathbf{P}(H \cap A) + \mathbf{P}(H \cap A^c) = \mathbf{P}(H \mid A)\,\mathbf{P}(A) + \mathbf{P}(H \mid A^c)\,\mathbf{P}(A^c)$$