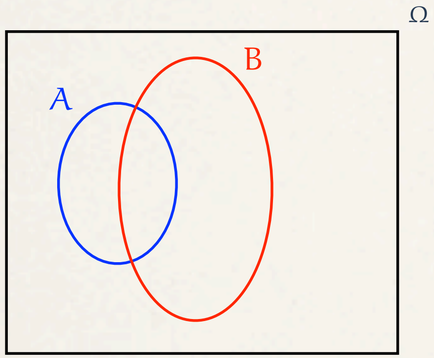
Additivity: inclusion and exclusion

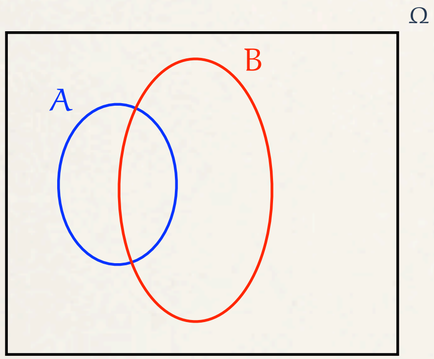
Two events A and B



Additivity: inclusion and exclusion

Three uses of additivity:

Two events A and B



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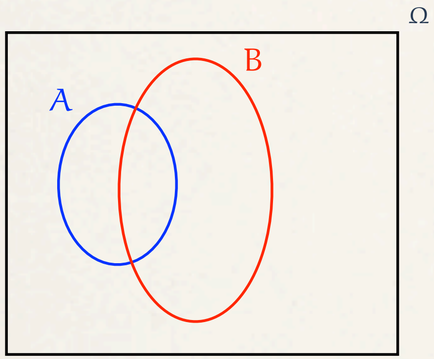

$$A = (A \setminus B) \cup (A \cap B)$$

$$\mathbf{P}(A \setminus B) = \mathbf{P}(A) - \mathbf{P}(A \cap B)$$

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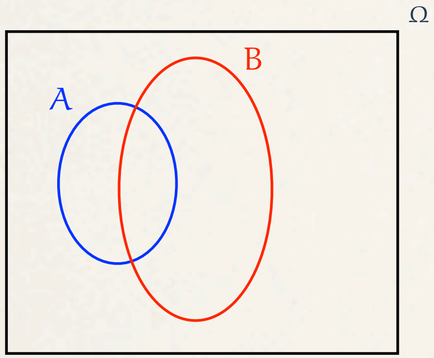

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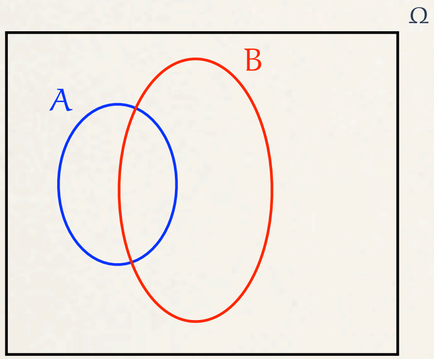

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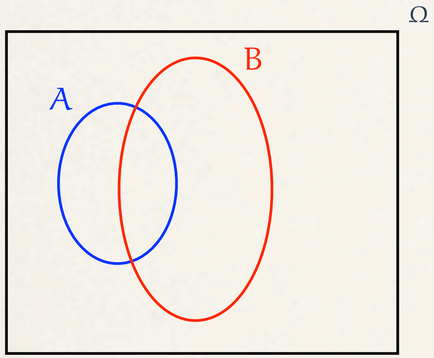

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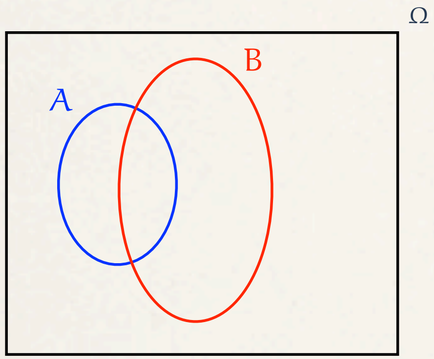

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What happens if A and B are disjoint? Or if A is a subset of B? What if $A = B$?