



**Result**

**Proposition 1.** *Suppose  $\mathbf{P}$  is finite probability measure on a set of outcomes  $\Omega$ . For any two events  $A, B$  with  $\mathbf{P}(A), \mathbf{P}(B) > 0$ , we have*

$$\mathbf{P}(A \mid B) = \frac{\mathbf{P}(B \mid A)\mathbf{P}(A)}{\mathbf{P}(B)}.$$

*Proof.* By definition, we have

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

so  $\mathbf{P}(A \mid B)\mathbf{P}(B) = \mathbf{P}(A \cap B) = \mathbf{P}(B \mid A)\mathbf{P}(A)$ . □



