Problem

Suppose a family has 2 children, one of which is a boy. What is the probability that both children are boys?

Solution

There are 4 possible scenarios: (B, B), (B, G), (G, B), (G, G)

Let's consider events:

- A - both children are boys {BB}

- B - at least one of the children is a boy {BB, BG, GB}

$$P(A) = \frac{1}{4}$$

$$P(B) = \frac{3}{4}$$

Conditional probability:

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$P(A \cap B) = P(A)$$

$$P(A|B) = \frac{P(A)}{P(B)} = \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{3}$$