

2) A family has two children; What is the probability that both the children are boys, given that atleast one of them is boy.

Soln: Let B denotes for Boy and
G denotes for Girl.

So, The sample space with two children will be.

$$S \equiv \{(B, B), (B, G), (G, B), (G, G)\}.$$

Let E be our experiment 1, i.e.

E: Both children are boys.

F: Atleast one of them is Boy.

$$\Rightarrow E = \{(B, B)\}$$

$$F = \{(B, B), (B, G), (G, B)\}$$

$$E \cap F = \{(B, B)\}.$$

$$P(E) = \frac{1}{4}, \quad P(F) = \frac{3}{4}, \quad P(E \cap F) = \frac{1}{4}.$$

$$\begin{aligned} \therefore P(E|F) &= \frac{P(E \cap F)}{P(F)} \\ &= \frac{1/4}{3/4} = \frac{1}{3}. \end{aligned}$$

\Rightarrow Hence, $\frac{1}{3}$ is the probability for our experiment.