

# Assignment 5

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**Abstract**—This document contains a problem from example 2 of CBSE Class 12 (Probability) .

**Problem 1. Example 2A** *family has two children. What is the probability that both the children are boys given that at least one of them is a boy ?*

**Solution:** let's denote boy as b and girl as g  
then sample space of the experiment by  $S$

$$S = \{(g, g), (g, b), (b, g), (b, b)\} \quad (1)$$

let  $E, F$  be the following events

$E \implies$  both the children are boys.

$F \implies$  at least one of the child is boy.

let's denote these events by random variables.

Variable	Event
$X_1 = 1$	E
$X_2 = 1$	F
$g$	girl
$b$	boy

TABLE I

$$\implies E = \{(b, b)\} \quad (2)$$

$$\implies F = \{(g, b), (b, g), (b, b)\} \quad (3)$$

$$\implies E \cap F = \{(b, b)\} \quad (4)$$

$$\implies P(X_2 = 1) = \frac{3}{4} \quad (5)$$

$$\implies P(X_1 = 1, X_2 = 1) = \frac{1}{4} \quad (6)$$

Therefore,

$$P(E|F) = \frac{P(X_1 = 1, X_2 = 1)}{P(X_2 = 1)} \quad (7)$$

$$= \frac{\frac{1}{4}}{\frac{3}{4}} \quad (8)$$

$$\implies P(E|F) = \frac{1}{3} \quad (9)$$