Assignment 12

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Download all python codes from

https://github.com/tejasri3657/Assignment−12/blob/main/Assignment_12(1).py

and latex-tikz codes from

https://github.com/tejasri3657/Assignment−12/new/main

1 Question No. 2.5

A couple has two children,

1) Find the probability that both children are male, if it is known that at least one of the children is male.
2) Find the probability that both children are female, if it is known that at least one of the children is female.

2 Solution

Lemma 2.1. *If A and B are two events in a sample space S, then the Conditional Probability of A given B is defined as* $P(A \mid B) = \frac{P(A \cap B)}{P(B)}$

From the given information we have,

Events	Description
E_1	Both children are male
F_1	At least one child is male
E_2	Both children are female
F_2	At least one child is female
$(E_1 \cap F_1)$	Both children are male and at least one child is male
$(E_1 \cap F_2)$	Both children are female and at least one child is female

Let boy be denoted by B and girl be denoted by G respectively.

$$S = \{BB, BG, GB, GG\} \tag{2.0.1}$$

1) We need to find P $=(E_1 \mid F_1)$:

$$P(E_1) = \frac{1}{4}, P(F_1) = \frac{3}{4} \tag{2.0.2}$$

$$P(E_1 \cap F_1) = \frac{1}{4} \tag{2.0.3}$$

$$\therefore P(E_1|F_1) = \frac{1}{3} \tag{2.0.4}$$

2) We need to find P $=(E2 \mid F2)$:

$$P(E_2) = \frac{1}{4}, P(F_2) = \frac{1}{2} \tag{2.0.5}$$

$$P(E_2 \cap F_2) = \frac{1}{4} \tag{2.0.6}$$

$$\therefore P(E_2|F_2) = \frac{1}{2} \tag{2.0.7}$$