Assignment 2

AI22BTECH11015

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Question 12.13.1.12: Assume that each born child is equally likely to be a boy or a girl. If a family has two children, what is the conditional probability that both are given that(1) the youngest is a girl, (2) at least one is a girl?

sol:

Let the first(elder) child be denoted by capital letter and the second(younger) by a small letter.The sample space is

S={Bb,Bg,Gb,Gg} this gives n(S)=4

Let E: both children are girls, then E = {Gg}

$$\implies n(E) = 1 \implies \Pr(E) = \frac{1}{4}$$

1) Let F : the youngest (second) child is a girl,then

$$F = \{Bg, Gg\} \therefore n(F) = 2 \implies \Pr(F) = \frac{n(F)}{n(S)} = \frac{2}{4}$$

$$EF = \{Gg\} \therefore n(EF) = 1 \implies \Pr(EF) = \frac{1}{4}$$

$$\therefore \Pr(E|F) = \frac{\Pr(EF)}{\Pr(F)} = \frac{\frac{1}{4}}{\frac{1}{2}}.$$

2) Let F : at least one(child) is a girl.
then F = {Bg,Gb,Gg}

$$\therefore n(F) = 3 \implies n(EF) = 1 \implies \Pr(EF) = \frac{1}{4}$$

$$\therefore \Pr(E|F) = \frac{\Pr(EF)}{F} = \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{3}$$