

Assignment 3

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1 Prob. 2.10

A 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 g and b denote girl and boy respectively. then sample space

$$S = \{gg, gb, bg, bb\}$$

X_1 = Random variable for first children

X_2 =Random variable for second children

X_3 =Random variable that at least one

among children is a boy or a girl
 $X_1, X_2, X_3 \in \{0,1\}$

$$P(X_3 = 1) = \frac{3}{4}$$

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

$$P(X_1 = 1, X_2 = 1 | X_3 = 1) = \frac{P(X_1 = 1, X_2 = 1)}{P(X_3 = 1)}$$

$$= \frac{\frac{1}{4}}{\frac{3}{4}}$$

$$= \frac{1}{3}$$

$$= 0.333$$