4, 5, 6}. If A denotes an even number and B a number greater than 4, then $A = \{2, 4, 6\}$ and $B = \{5, 6\}$, then

(i) $P(A) = \dfrac{n(A)}{n(S)} = \dfrac{3}{6} = \dfrac{1}{2}$ and (ii) $P(B) = \dfrac{n(B)}{n(S)} = \dfrac{2}{6} = \dfrac{1}{3}$.

Example 7.24: A newly married couple plans to have two children, and suppose that each child is equally likely to be a boy or a girl. In order to find a sample space for this experiment, let B denote that a child is a boy and G denote that a child is a girl. Then one possible sample space that can be formed is

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

The double BG, for instance represents the outcome 'the older child is a boy', while 'the younger one is a girl'.

(a) What is the probability that the couple will have two boys?

(b) What is the probability that the couple will have one boy and one girl?

the event of interest is $X < 2$ and number of cases favorable to this event is 2, so that the required probability is.

$$P(X < 2) = P(A_1) + P(A_8) = \frac{2}{8} = \frac{1}{4}$$

Example 7.27: A businessman has a stock of 8400 baby wears imported from 5 different countries. The distribution of the wears was as follows:

Country	Number of wears
USA	1500
India	1200
China	2700
Korea	1000
Thailand	2000
Total	8400

A piece of baby wear was selected at random. What is the probability that it was imported from (i) USA, from (ii) China, and (iii) either from India or from Thailand?

Solution: Using classical definition of probability, we find that

$$P(\text{USA}) = \frac{1500}{8400} = 0.18, \quad P(\text{China}) = \frac{2700}{8400} = 0.32$$

$$P(\text{India or Thailand}) = \frac{1200}{8400} + \frac{2000}{8400} = 0.13 + 0.24 = 0.37$$

Example 7.28: A leap year consists of 366 days with 29 days in February. If a leap year is selected at random, what is the probability that the selected leap year will consist of 53 Saturdays?

andomly chosen person is a male and at the ed? This is a joint probability and the associated event of interest is $M \cap E$. Thus

$$P(M \cap E) = \frac{n(M \cap E)}{n(S)} = \frac{255}{500} = 0.51$$

Similarly, we can find the probability that the selected male is unemployed:

$$P(M \cap U) = \frac{n(M \cap U)}{n(S)} = \frac{20}{500} = 0.04$$

Note that the marginal probability can also be computed as a sum of the two joint probabilities:

$$P(M) = P(M \cap E) + P(M \cap U) = .51 + .04 = 0.55$$

as ought to be.

Example 7.36: In an office of 100 employees, 75 read English, 50 read Bangla dailies and 40 read both. An employee is selected at random. What is the probability that the selected employee

(a) Reads English newspaper?
(b) Reads at least one of the papers?
(c) Reads none?
(d) Reads English but not Bangla?

Solution: Let us define the above events:

$$P(B) \qquad 6/36 \qquad 3$$

Alternatively, if B is considered as a reduced sample space, then only two sample points, viz. (5, 5) and (5, 6) are favorable to the event that the sum is 10 or more. Since there are 6 sample points in B, the required probability is

$$P(A \mid B) = \frac{2}{6} = \frac{1}{3},$$

as ought to be.

Example 7.38: The probability that a married man watches a certain T show is 0.4 and that his wife watches the show is 0.5. The probability th a man watches the show, given that his wife does, is 0[illegible]. Find

(a) The probability that a married couple watches the show.
(b) The probability that a wife watches the show given that her husband does.
(c) The probability that at least one of the partners will watch the show.

Example 7.44: Two ideal coins are tossed. Let A be the event 'head on the first coin' and B the event that 'head on the second coin. A sample space for this experiment is

$$S = \{HH, HT, TH, TT\}.$$

We define two events A and B as follows:

$$A = \{HH, HT\} \text{ and } B = \{HH, TH\}$$

The intersection of these events is

$$A \cap B = \{HH\}$$

It follows that $P(A \cap B) = \frac{1}{4}$ and that $P(A) = \frac{1}{2}$ and $P(B) = \frac{1}{2}$. Clearly

$$P(A \cap B) = P(A) \times P(B).$$

By definition, the events A and B are independent, implying that occurrence of head on the first coin does not influence the occurrence of head on the second coin.

Example 7.45: Three coins are tossed. Show that the events "heads on the first coin" and the event "tails on the last two" are independent.

space for the above experiment.

the events "heads on the
last two" are independent

construct a sample S space for the above experiment.

$$S=\{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$$

Let A denote the event "head on the first coin" and B denote event "tails on the last two coins". Then

$A=\{HHT, HHT, HTH, HTT\}$ and $B=\{HTT, TTT\}$, so that their intersection is $A\cap B=\{HTT\}$

Hence

Since
$$P(A)=\frac{4}{8}=\frac{1}{2},\ P(B)=\frac{2}{8}=\frac{1}{4} \text{ and } P(A\cap B)=\frac{1}{8}$$

$$P(A)\times P(B)=\frac{1}{2}\times\frac{1}{4}=\frac{1}{8}=P(A\cap B),$$

the events "heads on the first coin" and "tails on the last two" are independent.

Example7.46: A fire brigade has two fire engines operating independently. The probability that a specific fire engine is available when needed is 0.99.

(a) What is the probability that an engine is available when needed?

(b) What is the probability that neither is available when needed?

Solution: Let A be the event that the first engine is available when needed and B be the event that the second engine is