Section 1.2

1. What is the sample space of the following experiments? What is the size of the sample space?
2. The outcomes of a six-sided die roll.

S= and size is 6.

1. The outcomes of a coin toss.

S= and size is 2.

1. The outcomes of choosing a day of the week

S=

and size is 7.

1. Length of a Person’s Life.

We measure the exact length of a person's life in years. The lifetime, in theory, could be any non-negative real number. Thus, the size of the sample space is infinite, because there are infinitely many possible years.

1. What is the complement of the following events?
2. Rolling an even number on a die

The complement is rolling an odd number.

1. Rolling a number greater than 3 on a six-sided die

The complement is rolling a number that is 3 or less than 3.

1. Selecting a day that is a weekend

The complement is selecting a day that weekday.

1. Drawing a red card from a standard deck of 52 cards.

Drawing a black card from the deck (All clubs and spades)

1. Probability of complements problems.
2. Pr(A)=0.4 What is Pr()?

Pr()= 1- Pr(A)= 1-0.4=0.6

1. Let B is rolling a number greater than 4 on a six-sided die. What is Pr(?

is rolling a number less than 4 or 4 itself on a six-sided die.

Pr(= 4/6 = 0.67

1. Are these events disjoint/mutually exclusive?
2. Flipping heads and flipping tails on one coin flip.

Yes. Heads and tails cannot occur at the same time.

1. Being taller than 5 feet and being taller than 6 feet.

No. These events can occur at the same time. Someone who is 7.5 feet tall is both taller than 5 feet and 6 feet.

1. Scoring at least 2 goals and scoring less than 3 goals.

No. Scoring exactly 2 goals makes both of these events true.

1. What is the probability of these unions of events?
2. Pr(rolling a 2 or rolling a 4)

Rolling a 2 and rolling a 4 are disjoint. So,

Pr()=Pr(2)+Pr(4)=1/6+1/6=1/3

1. Pr(flipping heads or flipping tails on one flip)

Flipping heads and flipping tails are disjoint. So,

Pr()=Pr(H)+Pr(T)= 0.5+0.5=1

1. Pr(), where Pr(A) = 0.5, Pr(B) = 0.6 and Pr() = 0.4

Pr()=Pr(A)+Pr(B)- Pr()= 0.5+0.6-0.4=0.7

1. Are these events independent?
2. Flipping heads on the first flip and flipping heads on the second flip of a fair coin.

Yes. One coin flip does not influence the next flip, so the flips are independent.

1. Rolling an even number and rolling a 2 on a six-sided die.

No. If you roll a 2, you automatically know you roll an even number, so the events are not independent.

1. Pr(A) = 0.5,Pr(B) = 0.6, Pr()= 0.4

If two events are independent, Pr()= Pr(A)×Pr(B). Pr(A)×Pr(B) = 0.5×0.6 = 0.3 However Pr()= 0.4, so the events are not independent

1. Pr(A) = 0.2,Pr(B) = 0.3, Pr() = 0.06

Pr(A) ×Pr(B) = 0.2×0.3 = 0.06. Pr() = 0.06, so the events are independent.

1. Find Pr(). Suppose we know A and B are independent.
2. Pr(A) = 0.4,Pr(B) = 0.5

If two events are independent, Pr() = Pr(A)×Pr(B). Pr(A) ×Pr(B) = 0.4×0.5 = 0.2.

1. Pr(A) = 0.2,Pr(B) = 0.1

Pr() = Pr(A)×Pr(B) = 0.2×0.1=0.02

1. Pr(A) = 0.5, Pr(B) = 0.7

Pr() = Pr(A)×Pr(B) = 0.5×0.7=0.35

1. Find Pr()- dependent case.
2. Pr(A|B) = 0.4, Pr(B) = 0.5

Pr() = Pr(A|B) × Pr(B) = 0.5×0.4=0.2

1. Pr(A) = 0.2, Pr(B|A) = 0.1

Pr() = Pr(B|A) × Pr(A) = 0.1×0.2=0.02

1. Pr(A|B) = 0.5, Pr(B) = 0.7

Pr() = Pr(A|B) × Pr(B) = 0.5×0.7=0.35