

Discrete Mathematics and Statistics – CPT107

InClass Exercises – week 12

Question 1. A die is rolled, find the probability that an even number is obtained.

Solution

Let us first write the sample space S of the experiment.

$$S = \{1,2,3,4,5,6\}$$

Let E be the event "an even number is obtained" and write it down.

$$E = \{2,4,6\}$$

The probability.

$$P(E) = n(E) / n(S) = 3 / 6 = 1 / 2$$

Question 2. Two coins are tossed, find the probability that two heads are obtained.

Each coin has two possible outcomes H (heads) and T (Tails).

Solution

The sample space S is given by.

$$S = \{(H,T), (H,H), (T,H), (T,T)\}$$

Let E be the event "two heads are obtained".

$$E = \{(H,H)\}$$

The probability.

$$P(E) = n(E) / n(S) = 1 / 4$$

Question 3. Two dice are rolled, find the probability that the sum is

- a) equal to 1
- b) equal to 4
- c) less than 13

Solution

a) The sample space S of two dice is shown below.

$$S = \{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6)$$

$(2,1), (2,2), (2,3), (2,4), (2,5), (2,6)$
 $(3,1), (3,2), (3,3), (3,4), (3,5), (3,6)$
 $(4,1), (4,2), (4,3), (4,4), (4,5), (4,6)$
 $(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)$
 $(6,1), (6,2), (6,3), (6,4), (6,5), (6,6) \}$

Let E be the event "sum equal to 1". There are no outcomes which correspond to a sum equal to 1, hence

$$P(E) = n(E) / n(S) = 0 / 36 = 0$$

b) Three possible outcomes give a sum equal to 4: $E = \{(1,3), (2,2), (3,1)\}$, hence.

$$P(E) = n(E) / n(S) = 3 / 36 = 1 / 12$$

c) All possible outcomes, $E = S$, give a sum less than 13, hence.

$$P(E) = n(E) / n(S) = 36 / 36 = 1$$

Question 4. The blood groups of 200 people is distributed as follows: 50 have type **A** blood, 65 have **B** blood type, 70 have **O** blood type and 15 have type **AB** blood. If a person from this group is selected at random, what is the probability that this person has O blood type?

Solution

We construct a table of frequencies for the the blood groups as follows

group	frequency
A	50
B	65
O	70
AB	15

The probability

$$\begin{aligned}
 P(E) &= \text{Frequency for O blood} / \text{Total frequencies} \\
 &= 70 / 200 = 0.35
 \end{aligned}$$