

# 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

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