Take a look at the following examples that have been treated in class. Try to solve the questions in the book using the same notation.

Homework (*deadline* : Thursday, 15 June 2017)

16a	2
16b	1, 2, 5
16c	3, 4, (5)
16d	3
16e	1, 2, (3), (4)
16f	2, 3, (4)

Question 1

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

Solution The *sample space S* of the experiment

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

If *event E* represents "an even number is obtained"

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

The probability of event E is :

$$P(E) = \frac{3}{6} = \frac{1}{2}$$

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".

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

We use the formula of the classical probability.

$$P(E) = \frac{1}{4}$$

Question 3

Which of these numbers cannot be a probability ?

▶**1.** -0.00001
▶**2.** 0.5
▶**3.** 1.001
▶**4.** 0
▶**5.** 1
▶**6.** 20%

Solution A probability is always greater than or equal to 0 and less than or equal to 1, hence only 1) and 3) above cannot represent probabilities : -0.00010 is less than 0 and 1.001 is greater than 1.

Question 4

Two dice are rolled, find the probability that the sum is

▶**1.** equal to 1

▶**2.** equal to 4

▶**3.** less than 13

Solution

▶**1.** All the possibilities of rolling two dice are shown below

$$
S = \left\{ \begin{array}{cccccc}
(1,1), & (1,2), & (1,3), & (1,4), & (1,5), & (1,6) \\
(2,1), & (2,2), & (2,3), & (2,4), & (2,5), & (2,6) \\
(3,1), & (3,2), & (3,3), & (3,4), & (3,5), & (3,6) \\
(4,1), & (4,2), & (4,3), & (4,4), & (4,5), & (4,6) \\
(5,1), & (5,2), & (5,3), & (5,4), & (5,5), & (5,6) \\
(6,1), & (6,2), & (6,3), & (6,4), & (6,5), & (6,6)
\end{array} \right\}
$$

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

$$P(E) = \frac{0}{36}$$

▶**2.** Three possible outcomes give a sum equal to 4 : $E = \{(1,3),(2,2),(3,1)\}$, hence
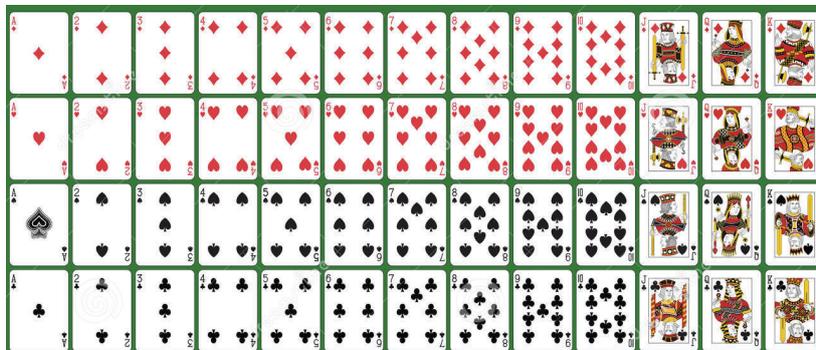
$$P(E) = \frac{3}{36} = \frac{1}{12}$$

▶**3.** All possible outcomes, $E = S$, give a sum less than 13, hence

$$P(E) = \frac{36}{36} = 1$$

Question 5

A card is drawn at random from a deck of cards. Find the probability of getting the 3 of diamond.

Solution All the possibilities of the experiment are shown below

Let E be the event "getting the 3 of diamond". An examination of the sample space shows that there is one "3 of diamond" so that the probability of event E occurring is given by

$$P(E) = \frac{1}{52}$$