

## Homework 2: logic

To submit: on Thursday, 21.10.2021, 9:30 a.m., online by the learning campus

### Exercise 1 (4 pts.)

Out of 1000 households surveyed, 487 own a CD player, 787 own a DVD player, 420 a PC, 382 a CD player and a DVD player, 292 a CD player and a PC and 303 a DVD player and a PC. 202 households answered to own all 3 devices.

How many of the households surveyed own

- a) none of the three devices?  $1000 - 27 - 304 - 15 - 101 - 90 - 180 - 202 = 81$
- b) only a DVD player?  $787 - 180 - 101 = 304$
- c) a PC and a CD player, but no DVD player?  $292 - 202 = 90$

Hint: the inclusion-exclusion formula, below for three sets  $A$ ,  $B$ , and  $C$ , might be useful:

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|$$

### Exercise 2 (8 pts.)

In the following table all interesting results linking two statements are given. Determine a (possibly simple) linking of the statements  $A$  and  $B$ , by using only  $\wedge$ ,  $\vee$ , and  $\neg$ .

Please enter your results in the empty cells of the table.

A	B	$A \wedge B$	$A \wedge \neg B$	$\neg A \wedge B$	$\neg A \wedge \neg B$
w	w	w	f	f	f
w	f	f	w	f	f
f	w	f	f	w	f
f	f	f	f	f	w

A	B	$A \vee B$	$A \vee \neg B$	$\neg A \vee B$	$\neg A \vee \neg B$
w	w	w	w	w	f
w	f	w	w	f	w
f	w	w	f	w	w
f	f	f	w	w	w

1000 total

487 CD

787 DVD

420 PC

382 CD+DVD

292 CD+PC

303 DVD+PC

202 CD+DVD+PC

180 only CD+DVD

90 only CD+PC

101 only DVD+PC

15 only CD

304 only DVD

27 only PC