

## Solution to Homework 28

**Problem.** On the example of the formula  $(\neg a \vee b \vee \neg c) \& (a \vee \neg b)$ , show how checking its satisfiability can be reduced to an instance of the interval computation problem.

**Solution.** For the above formula, with  $C_1 = a \vee b \vee \neg c$  and  $C_2 = \neg a \vee \neg b$ , we have:

- $P[a] = A$ ,  $P[\neg a] = 1 - A$ ,  $P[b] = B$ ,  $P[\neg b] = 1 - B$ ,  $P[c] = C$ , and  $P[\neg c] = 1 - C$ ;
- $P[C_1] = P[\neg a \vee b \vee \neg c] = 1 - (1 - (1 - A)) \cdot (1 - B) \cdot (1 - (1 - C))$ , thus

$$P[C_1] = 1 - A \cdot (1 - B) \cdot C;$$

- $P[C_2] = P[a \vee \neg b] = 1 - (1 - A) \cdot (1 - (1 - B)) = 1 - (1 - A) \cdot B$ ;

- thus,

$$P[F] = (1 - A \cdot (1 - B) \cdot C) \cdot (1 - (1 - A) \cdot B).$$