

Solution to Homework 30

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 $C_1 = \neg a \vee b \vee \neg c$ and $C_2 = a \vee \neg b$, 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,

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