(1, 3, 4, 6, 9, 12) P(x) 表示 x 上场

① $(P(4) \Rightarrow P(6)) \wedge (P(6) \Rightarrow P(4))$

$(\neg P(4) \vee P(6)) \wedge (\neg P(6) \vee P(4))$

② $\neg P(3) \Leftrightarrow \neg (P_1)$

$(\neg P(3) \Rightarrow \neg (P_1)) \wedge (\neg P(1) \Rightarrow \neg P(3))$

$(P(3) \vee \neg (P_1)) \wedge (P(1) \vee \neg P(3))$

③ $P(3) \otimes P(6)$

$= (P(3) \vee P(6)) \wedge \neg (P(3) \wedge P(6))$

$= (P(3) \vee P(6)) \wedge (\neg P(3) \vee \neg (P6))$

④ $P(9) \wedge P(12) \Rightarrow P(4)$

$\neg [P(9) \wedge P(12)] \vee P(4)$

$\neg P(9) \vee \neg (P12) \vee P(4)$

DPLL

function DPLL-SATISFIABLE?(s) **returns** *true* or *false*
  inputs: s, a sentence in propositional logic

  clauses ← the set of clauses in the CNF representation of s
  symbols ← a list of the proposition symbols in s
  return DPLL(*clauses*, *symbols*, { })

---

function DPLL(*clauses*, *symbols*, *model*) **returns** *true* or *false*

  if every clause in *clauses* is true in *model* **then return** *true*
  if some clause in *clauses* is false in *model* **then return** *false*
  P, *value* ← FIND-PURE-SYMBOL(*symbols*, *clauses*, *model*)
  if P is non-null **then return** DPLL(*clauses*, *symbols* − P, *model* ∪ {P=*value*})
  P, *value* ← FIND-UNIT-CLAUSE(*clauses*, *model*)
  if P is non-null **then return** DPLL(*clauses*, *symbols* − P, *model* ∪ {P=*value*})
  P ← FIRST(*symbols*); *rest* ← REST(*symbols*)
  return DPLL(*clauses*, *rest*, *model* ∪ {P=*true*}) **or**
    DPLL(*clauses*, *rest*, *model* ∪ {P=*false*}))

---

pure

$(\neg P(4) \vee P(6)) \wedge (\neg P(6) \vee P(4))$

$(P(3) \vee \neg P(1)) \wedge (P(1) \vee \neg P(3))$

$= (P(3) \vee P(6)) \wedge (\neg P(3) \vee \neg P(6))$

$\neg P(9) \vee \neg P(12) \vee P(4)$

$\wedge P(1) \wedge P(12)$

9, 12

F F

F T

T F

(1, 3, 4, 6, 9, 12)

× × × × ✓ ✓

① pure $\frac{P(9)}{F}$

② unit

P(1) P(12)

$\frac{1, 9, 12}{T\ F\ T}$ $\frac{3}{T}$ $\frac{6}{F}$ $\frac{4}{F}$

② $\forall x [(P(x) \wedge W(x)) \rightarrow h(x)]$

$\forall x [W(x) \vee l(x)] \rightarrow P(x)$

$\forall x \; l(x) \rightarrow W(x)$

$\neg (W(z)) \wedge l(z)$