

1 Problème 1 (échiquier)

1.1 Notations

- $n \times n$ = dimension de l'échiquier
- k_1 = nombre de tours
- k_2 = nombre de fous
- k_3 = nombre de cavaliers
- $m = (k_1 + k_2 + k_3)$
- $y = (t_1, t'_1, \dots, t_{k_1}, t'_{k_1}, f_1, f'_1, \dots, f_{k_2}, f'_{k_2}, h_1, h'_1, \dots, h_{k_3}, h'_{k_3})$

1.2 Question 1

1.2.1 Variables

$$X = \{t_i : i \in \{1, \dots, k_1\}, f_i : i \in \{1, \dots, k_2\}, h_i : i \in \{1, \dots, k_3\},$$

$$t'_i : i \in \{1, \dots, k_1\}, f'_i : i \in \{1, \dots, k_2\}, h'_i : i \in \{1, \dots, k_3\}$$

1.2.2 Domaine

$$D = \{1, \dots, n\}^2$$

1.2.3 Contraintes

- $c_1 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid \forall_{i,j} 1 \leq i \neq j \leq m \rightarrow (V_{2i} \neq V_{2j}) \vee (V_{2i+1} \neq V_{2j+1})\})$
- $c_2 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid \forall_{i,j} 1 \leq i \leq k_1, 1 \leq j \leq m \rightarrow (V_{2i} \neq V_{2j}) \wedge (V_{2i+1} \neq V_{2j+1})\})$
- $c_3 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid \forall_{i,j} k_1 + 1 \leq i \leq k_1 + k_2, 1 \leq j \leq m \rightarrow [(V_{2i} \neq V_{2j} + k) \wedge (V_{2i+1} \neq V_{2j+1} + k) \wedge (V_{2i} \neq V_{2j} - k) \wedge (V_{2i+1} \neq V_{2j+1} - k)], k \in \mathbb{Z}_0\})$
- $c_4 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid \forall_{i,j} k_1 + k_2 + 1 \leq i \leq k_1 + k_2 + k_3, 1 \leq j \leq m \rightarrow [(V_{2i} \neq V_{2j} + k) \wedge (V_{2i+1} \neq V_{2j+1} + l) \wedge (V_{2i} \neq V_{2j} + l) \wedge (V_{2i+1} \neq V_{2j+1} + k)], k \in \{-2, 2\}, l \in \{-1, 1\}\})$

1.3 Question 2

1.3.1 Variables

$$X = \{t_i : i \in \{1, \dots, k_1\}, f_i : i \in \{1, \dots, k_2\}, h_i : i \in \{1, \dots, k_3\},$$

$$t'_i : i \in \{1, \dots, k_1\}, f'_i : i \in \{1, \dots, k_2\}, h'_i : i \in \{1, \dots, k_3\}$$

1.3.2 Domaine

$$D = \{1, \dots, n\}^2$$

1.3.3 Contraintes

- $c_1 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid \forall_{i,j} 1 \leq i \neq j \leq m \rightarrow (V_{2i} \neq V_{2j}) \vee (V_{2i+1} \neq V_{2j+1})\})$
- $c_2 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid (\forall_i 1 \leq i \leq k_1 \rightarrow \exists j \in (1 \leq j \leq m) \mid (V_{2i} = V_{2j}) \vee (V_{2i+1} = V_{2j+1}))\})$
- $c_3 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid (\forall_i k_1 + 1 \leq i \leq k_1 + k_2 \rightarrow \exists j \in (1 \leq j \leq m) \mid [(V_{2i} = V_{2j} + k) \wedge (V_{2i+1} = V_{2j+1} + k) \vee (V_{2i} = V_{2j} - k) \wedge (V_{2i+1} = V_{2j+1} + k)])], k \in \mathbb{Z}_0\})$
- $c_4 = (y, \{(V_1, \dots, V_{2m}) \in D^{2m} \mid (\forall_i k_1 + k_2 + 1 \leq i \leq k_1 + k_2 + k_3 \rightarrow \exists j \in (1 \leq j \leq m) \mid [(V_{2i} = V_{2j} + k) \wedge (V_{2i+1} = V_{2j+1} + l) \vee (V_{2i} = V_{2j} + l) \wedge (V_{2i+1} = V_{2j+1} + k)])], k \in \{-2, 2\}, l \in \{-1, 1\}\})$