4-Queens Problem

N-Queens Problem (Mathematical model)

Variables:

$$X_i \in \{0, 1, 2, \ldots, NB\_queens\} \quad , \forall i = 0..NB\_queens$$

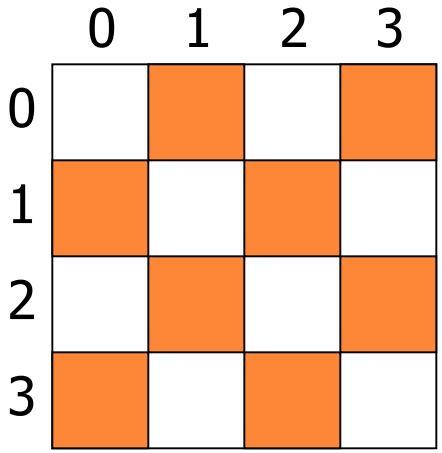
Constraints:

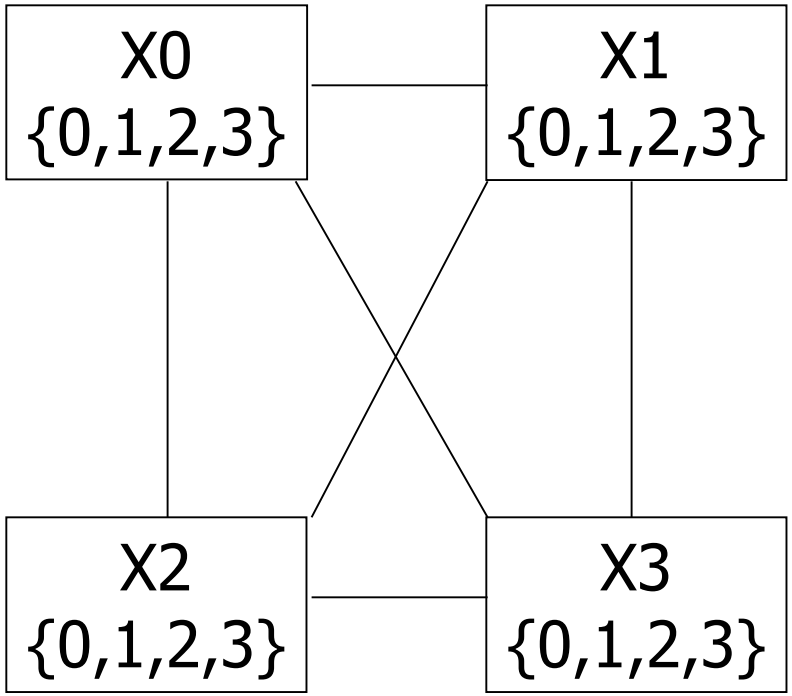
$$X_i \neq X_j \quad , \forall i = 0..NB\_queens - 1, \forall j = i + 1 \ldots . NB\_queens - 1$$

$$X_i \neq X_j + K \quad , \forall i = 0..NB\_queens - 1, \forall j = i + 1 \ldots . NB\_queens - 1, \forall K = j - i.$$

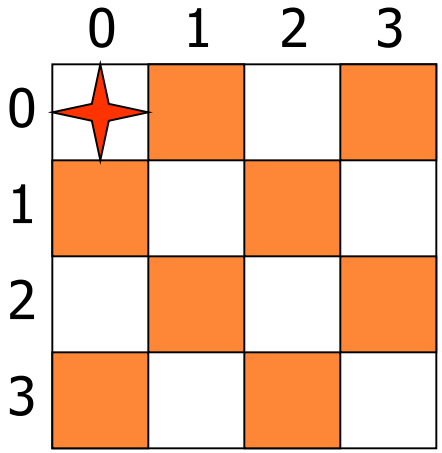
$$X_i \neq X_j - K \quad , \forall i = 0..NB\_queens - 1, \forall j = i + 1 \ldots . NB\_queens - 1, \forall K = j - i.$$

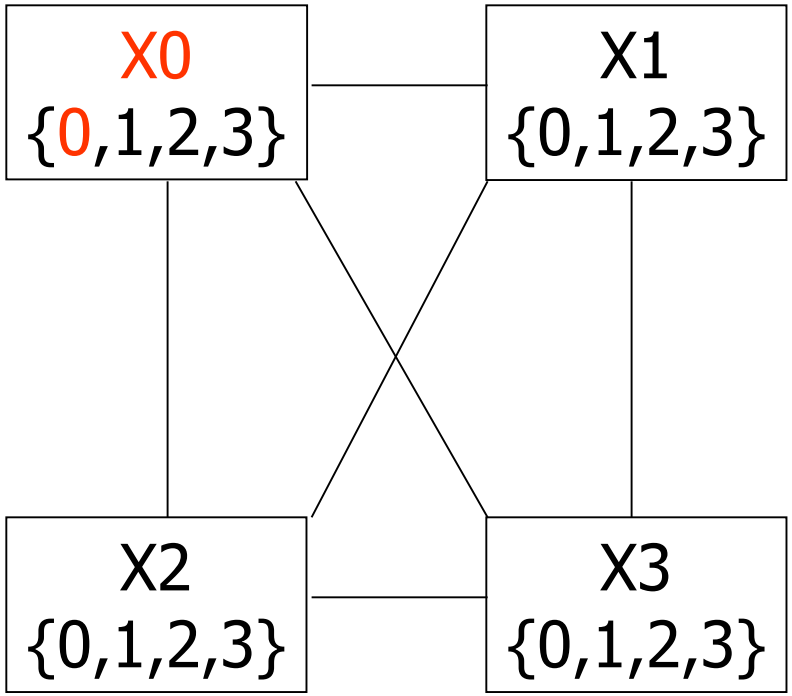
4-Queens Problem



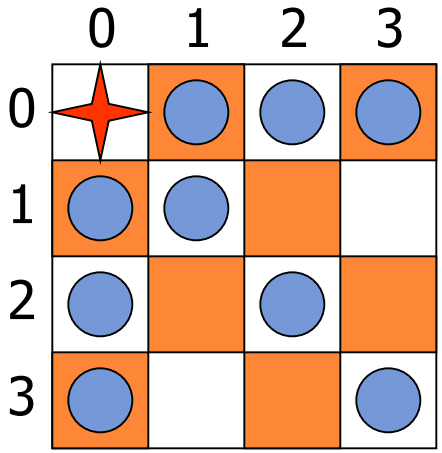


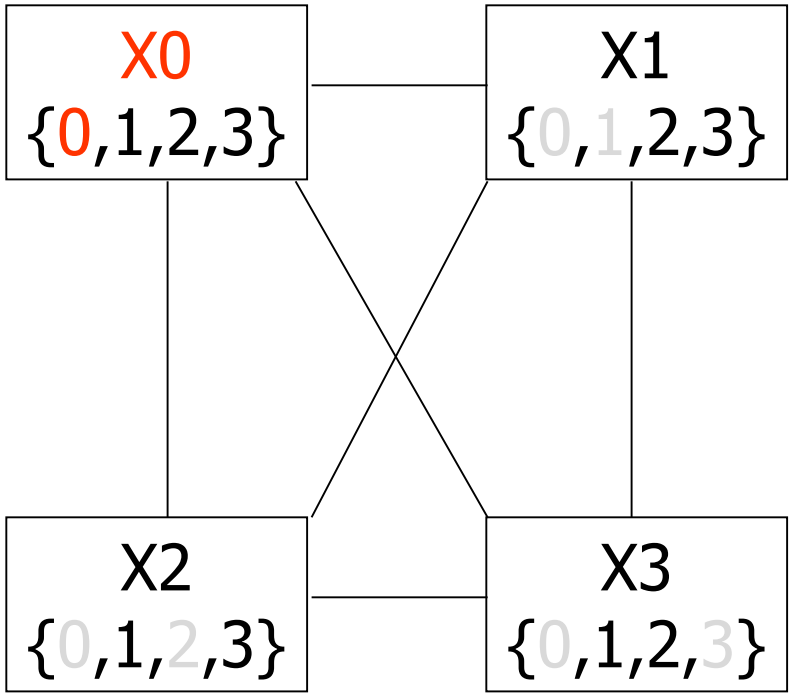
4-Queens Problem



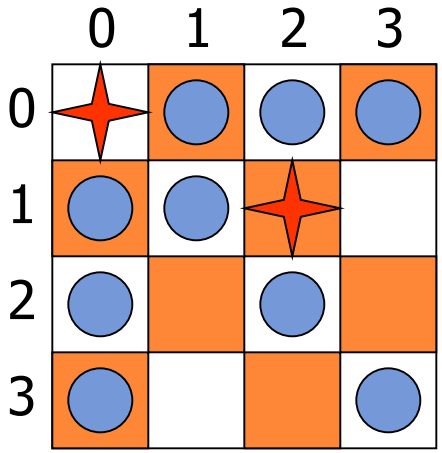


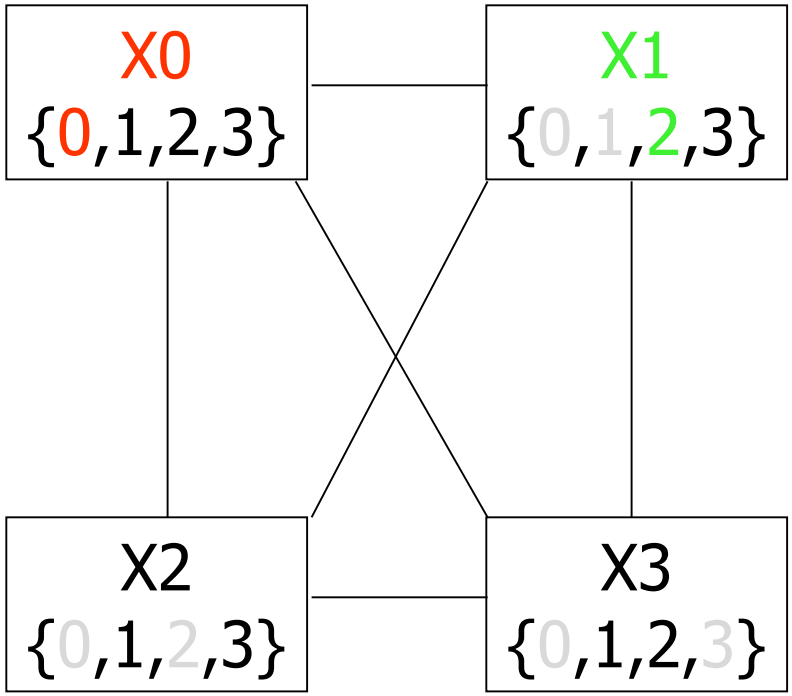
4-Queens Problem



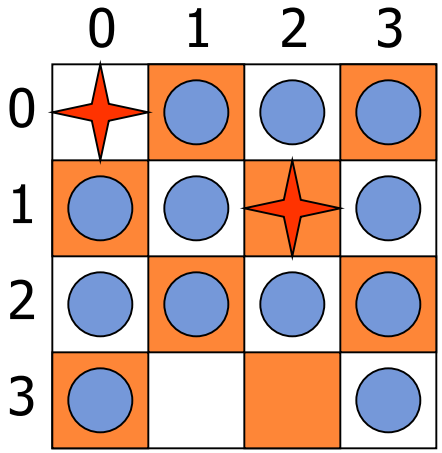


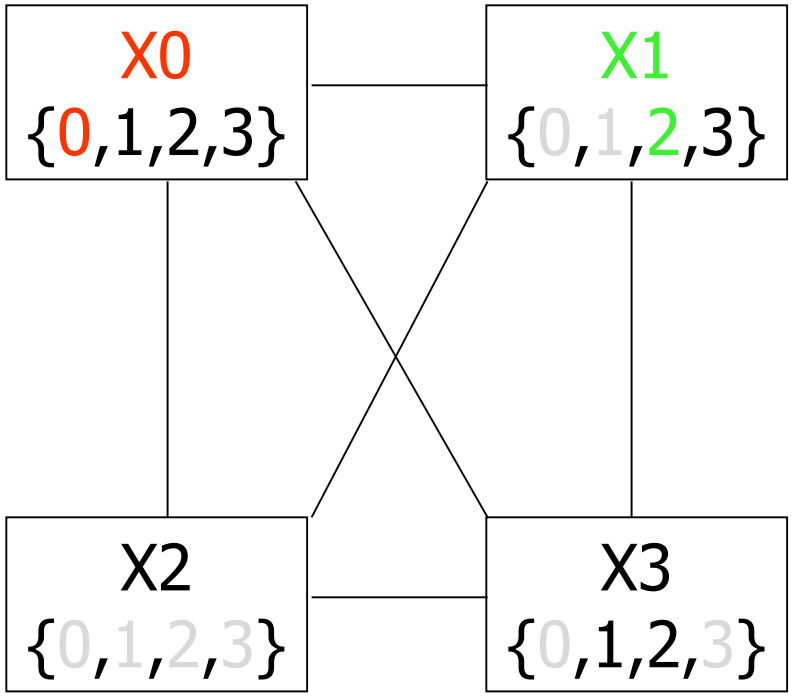
4-Queens Problem



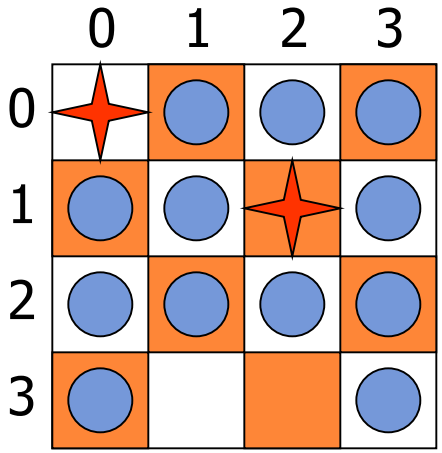


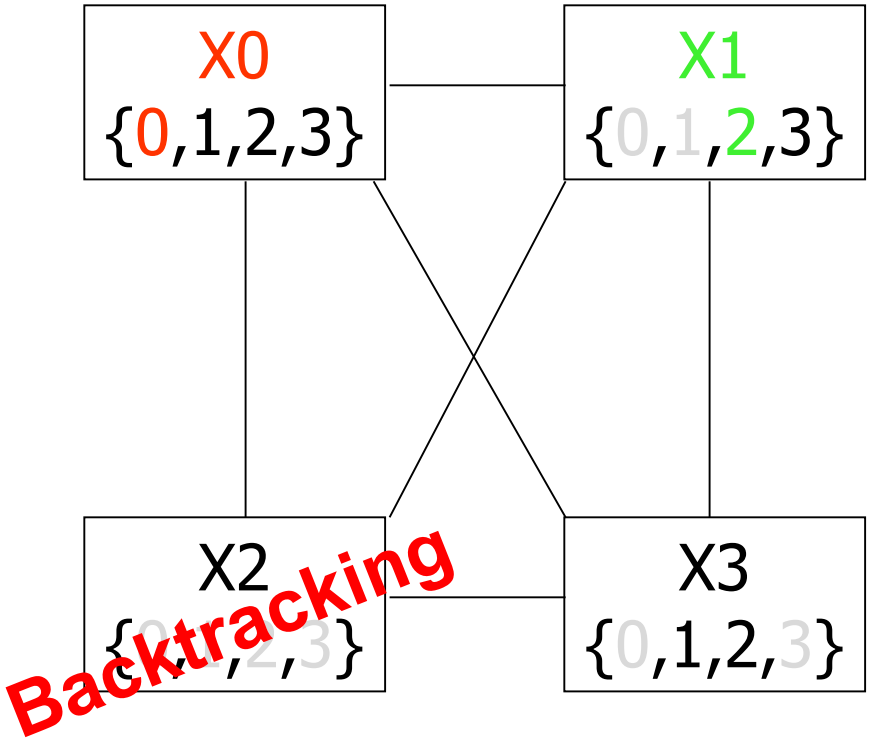
4-Queens Problem



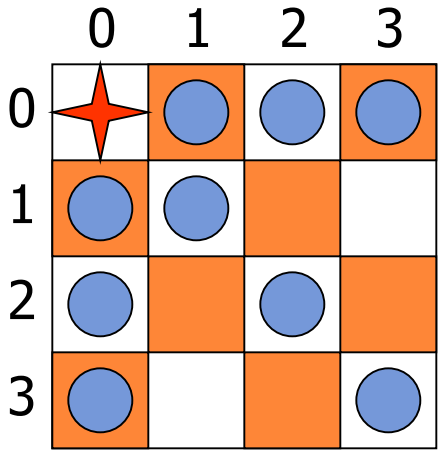


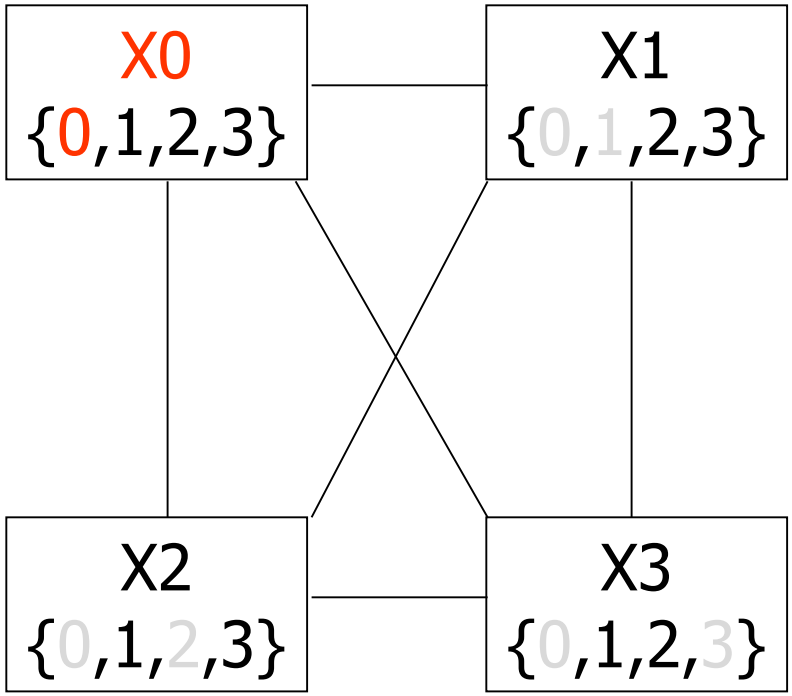
4-Queens Problem



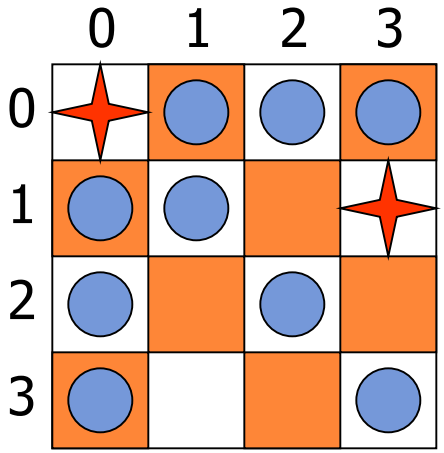


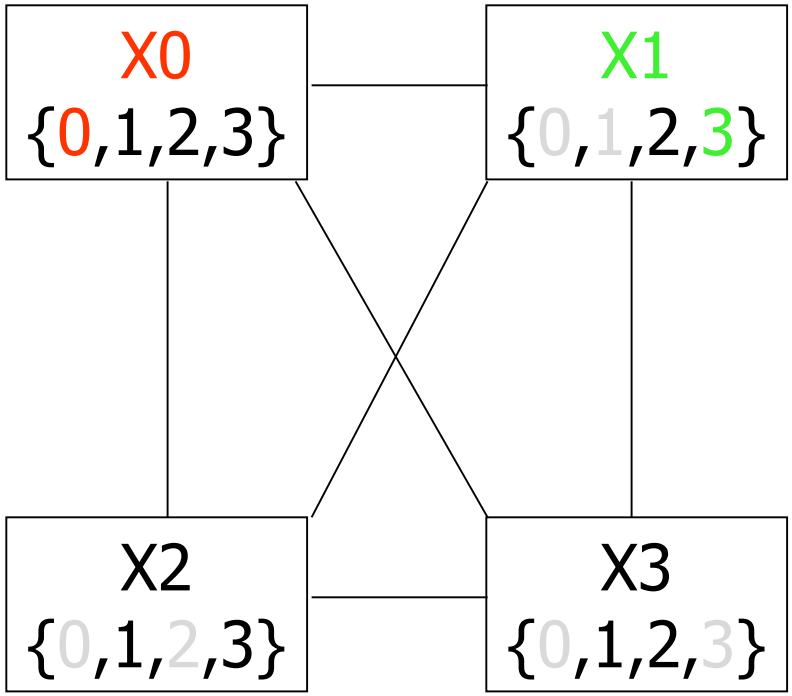
4-Queens Problem



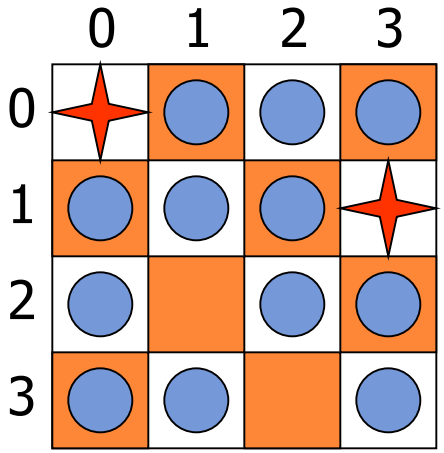


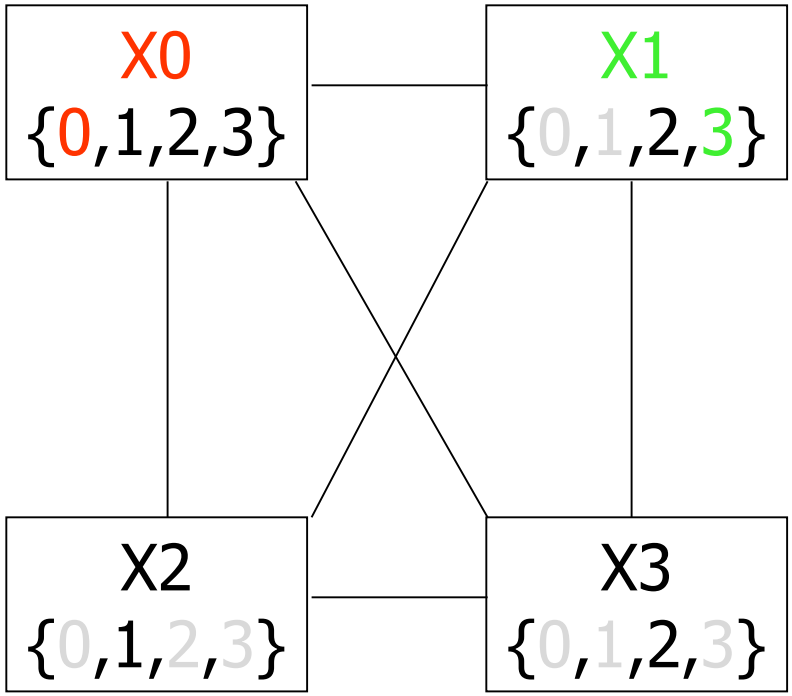
4-Queens Problem



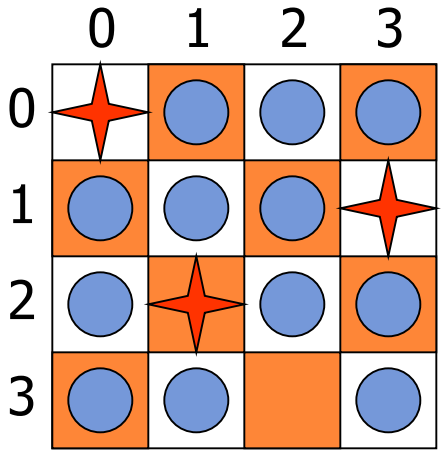


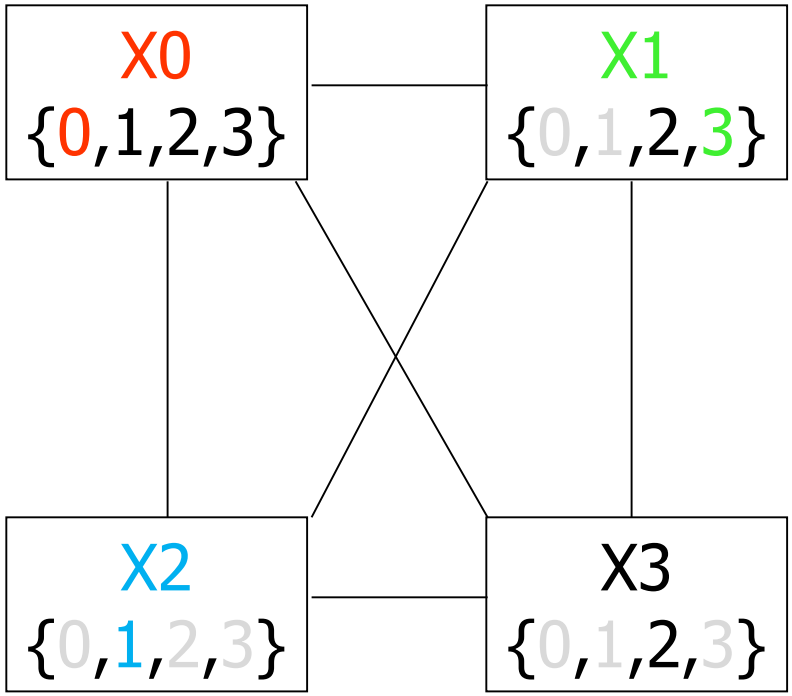
4-Queens Problem



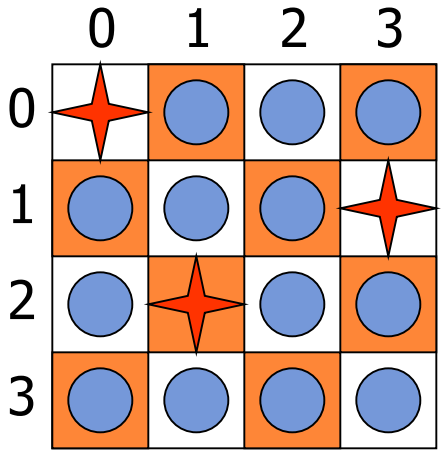


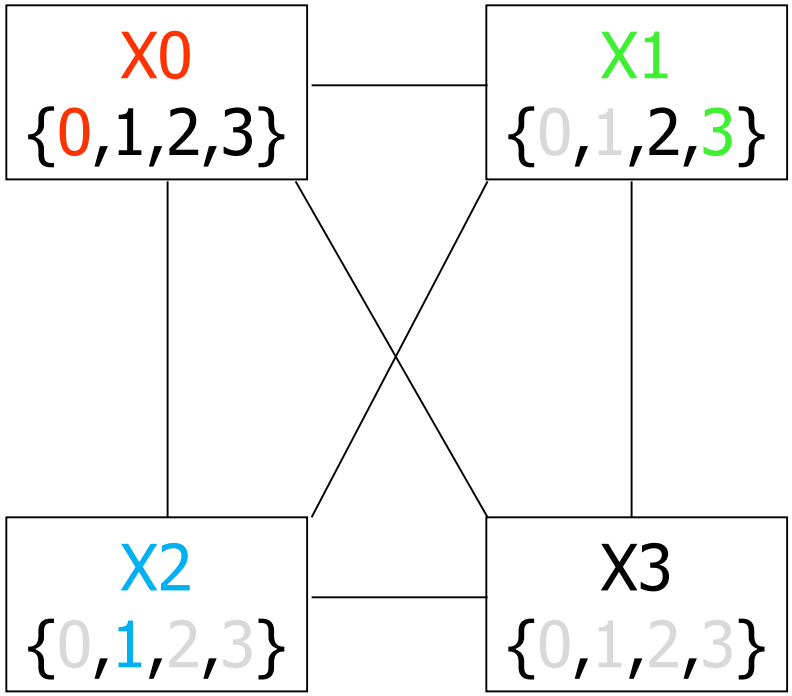
4-Queens Problem



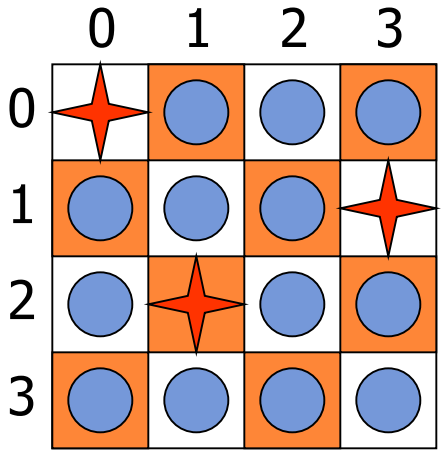


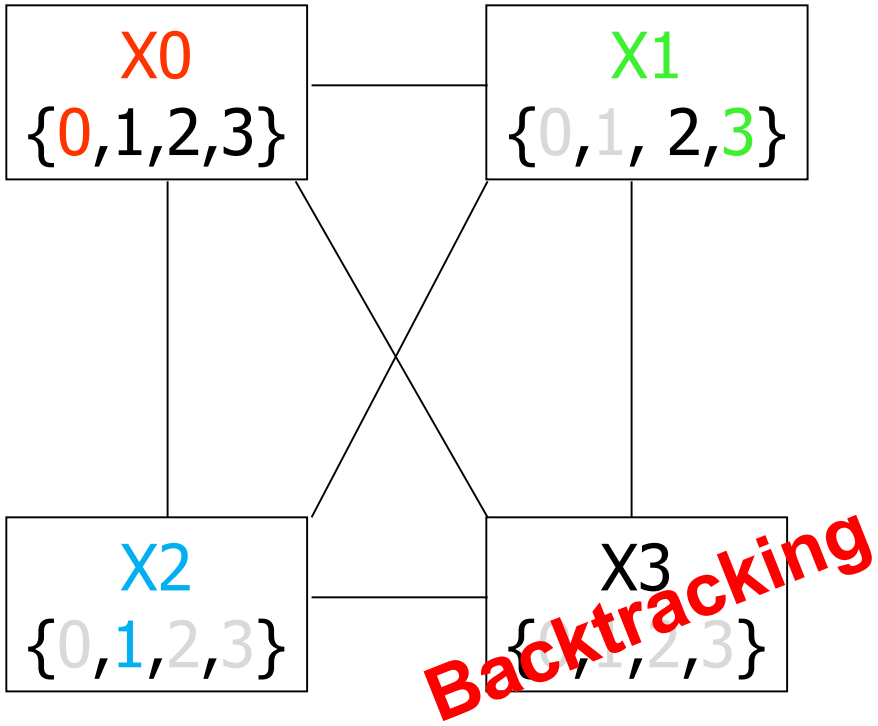
4-Queens Problem



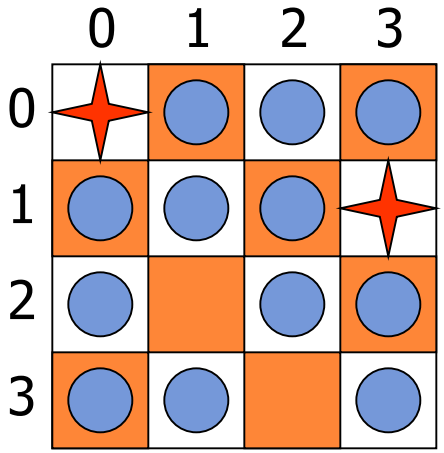


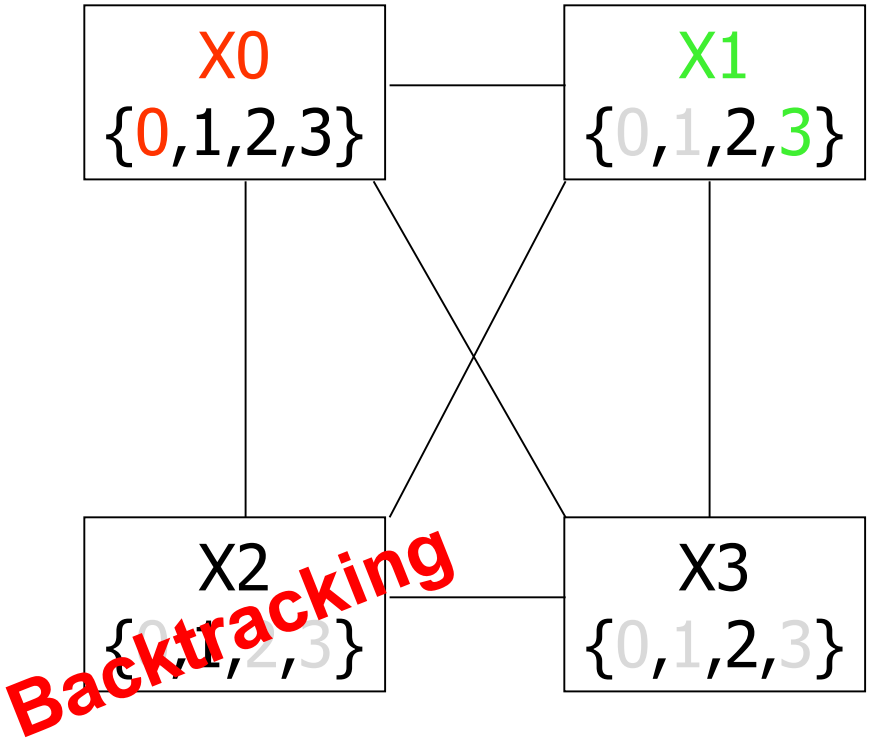
4-Queens Problem



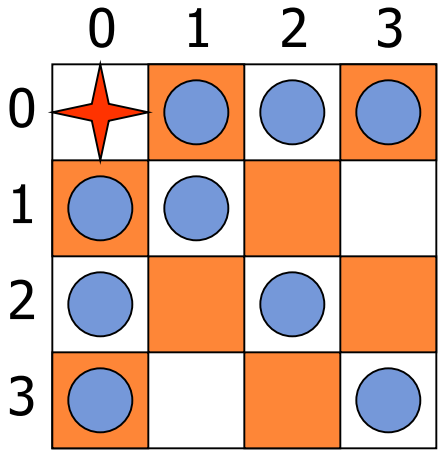


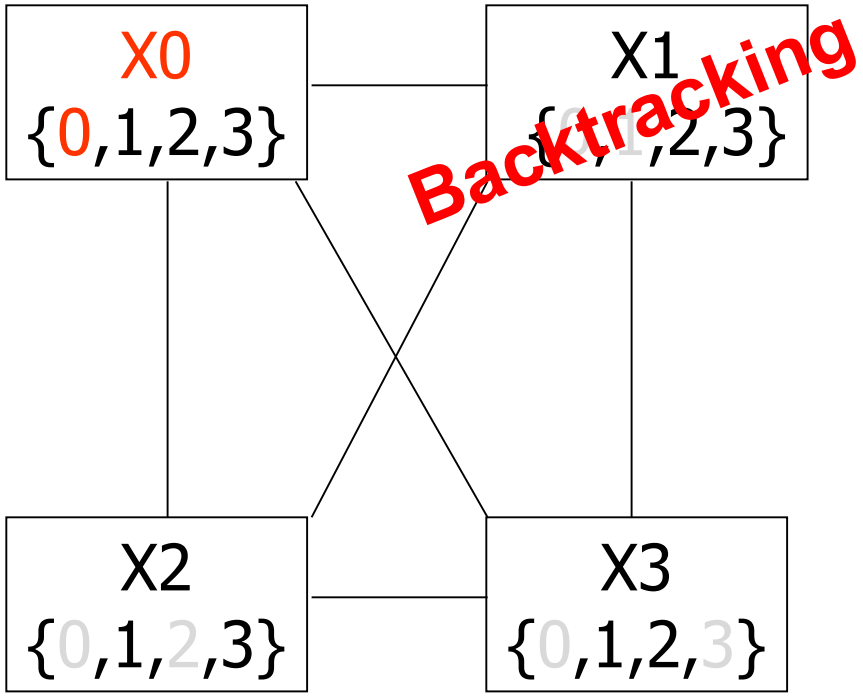
4-Queens Problem



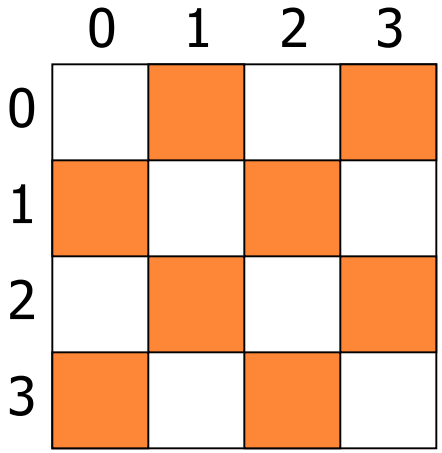


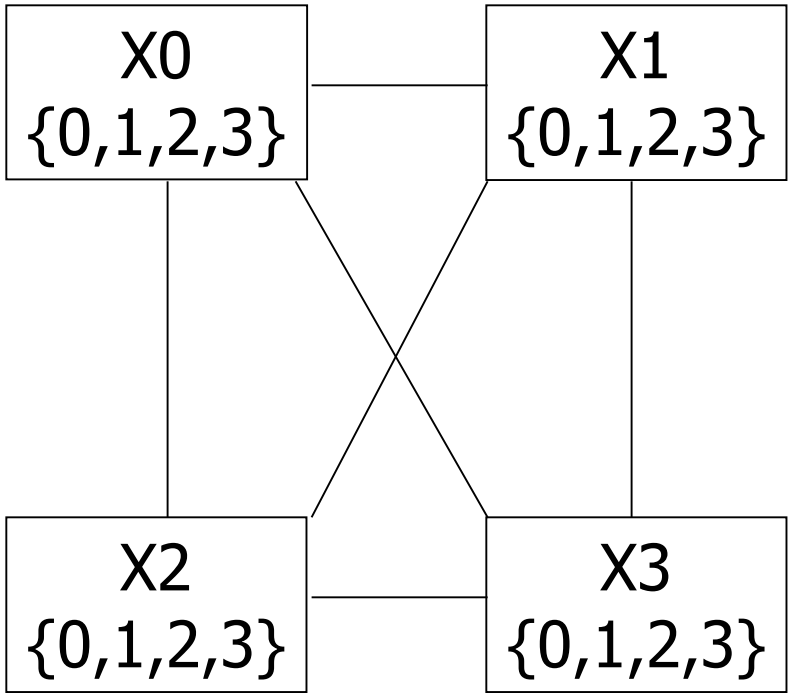
4-Queens Problem



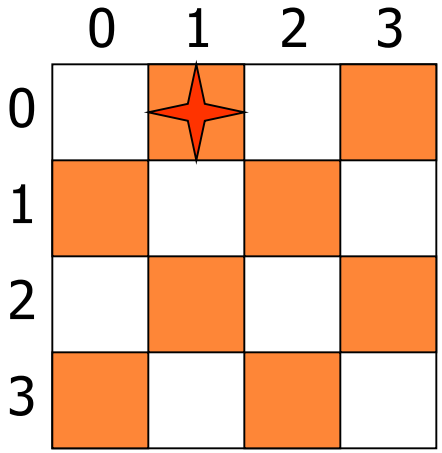


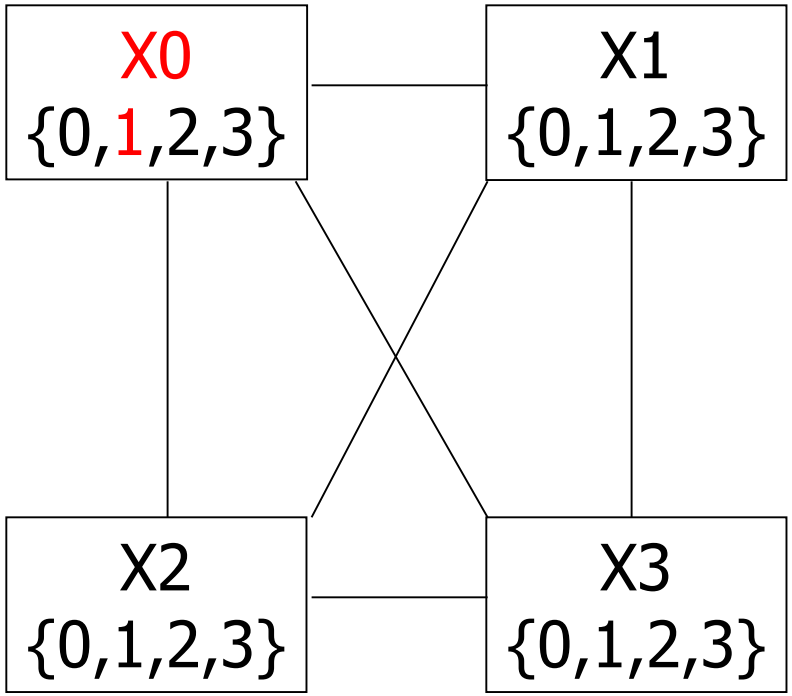
4-Queens Problem



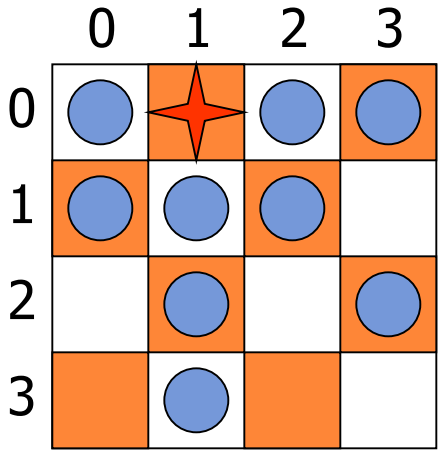


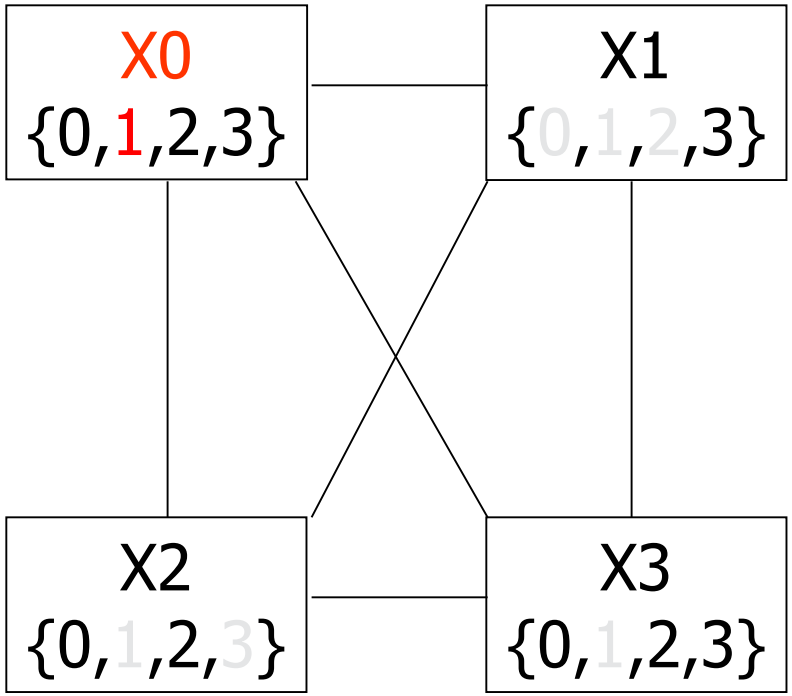
4-Queens Problem



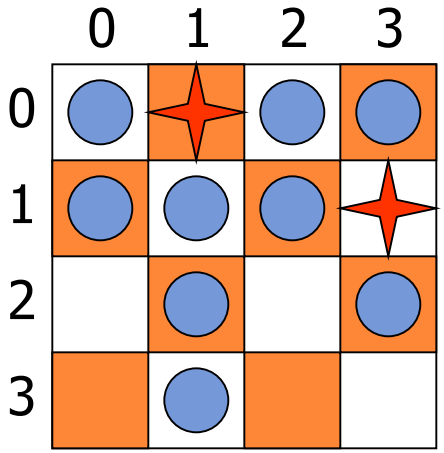


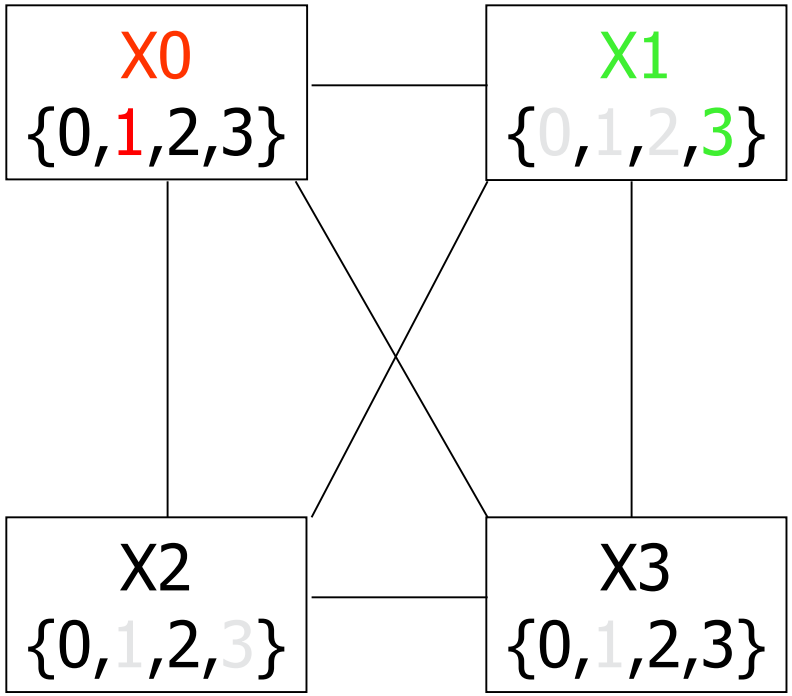
4-Queens Problem



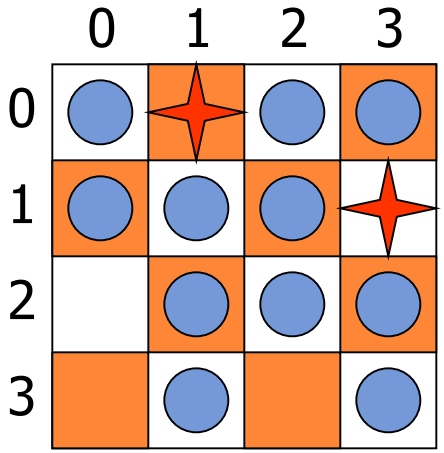


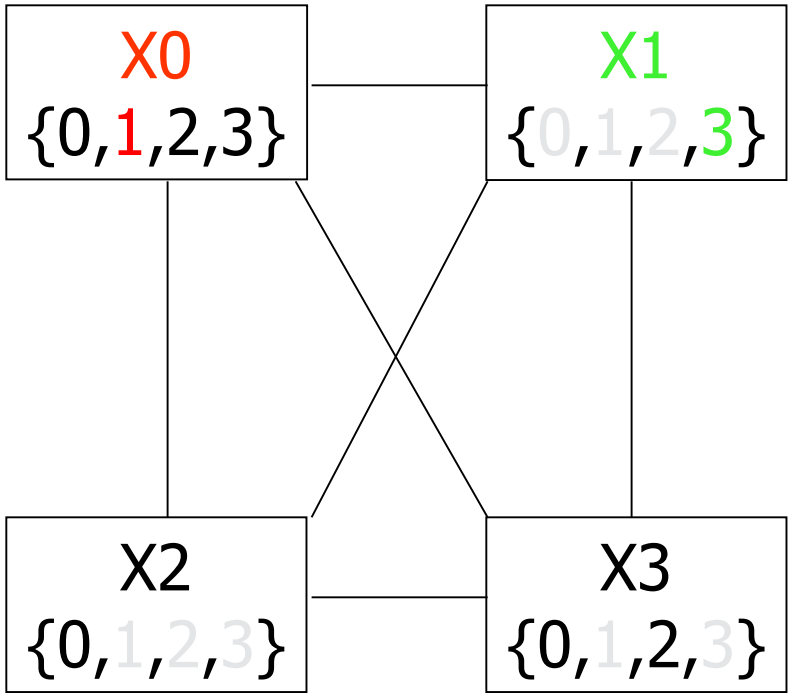
4-Queens Problem



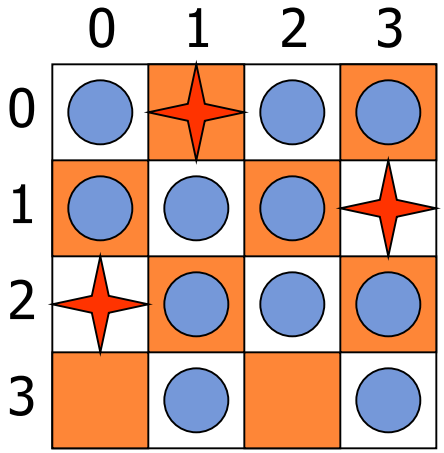


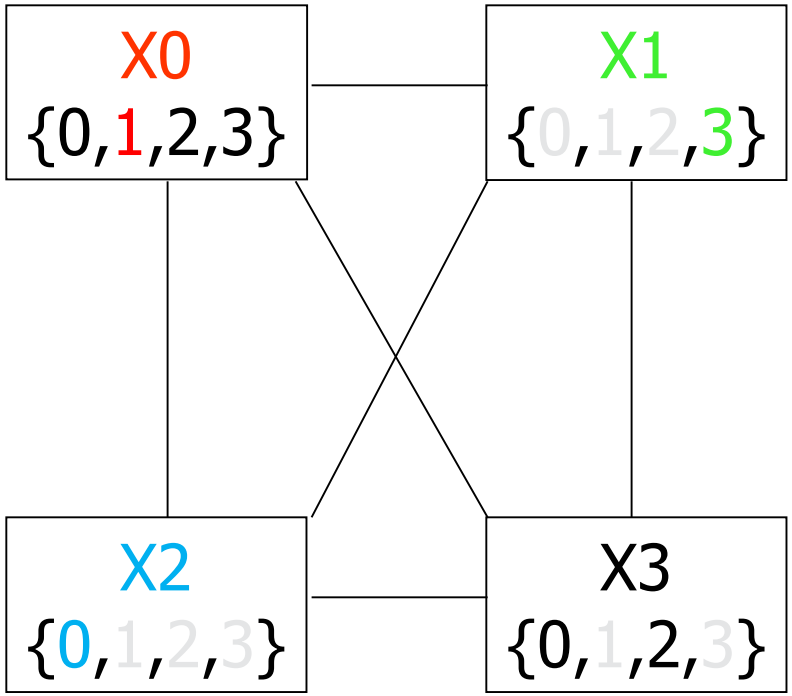
4-Queens Problem



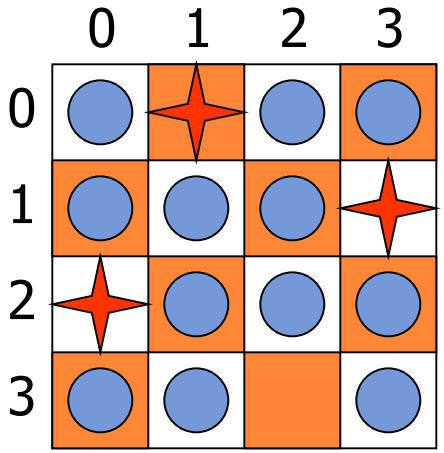


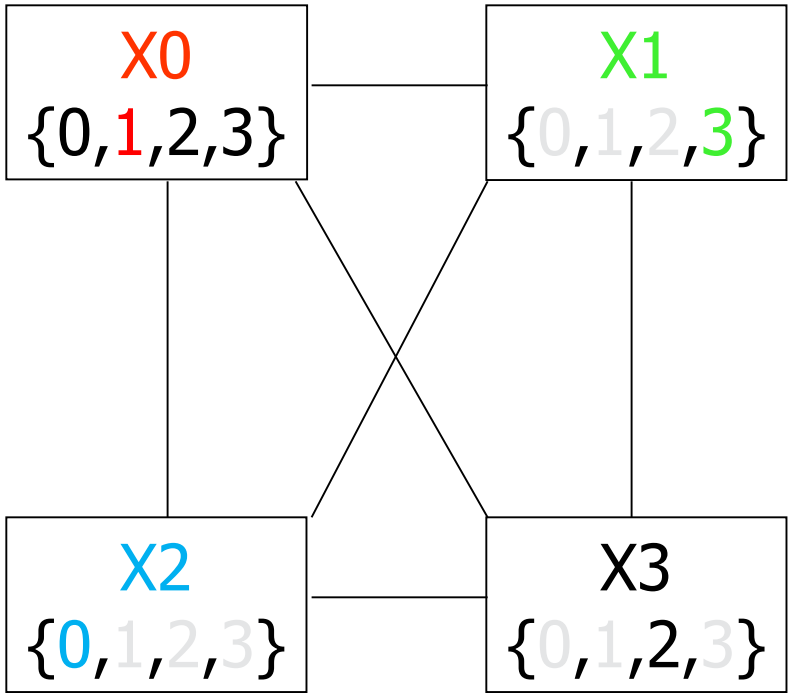
4-Queens Problem



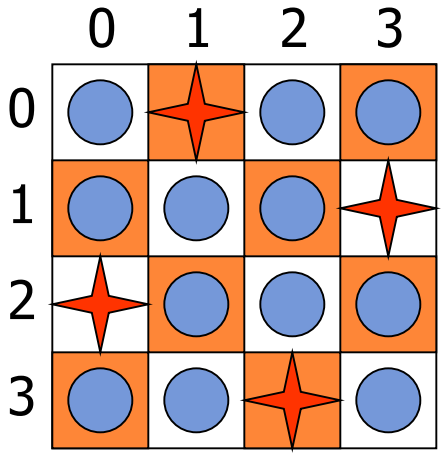


4-Queens Problem

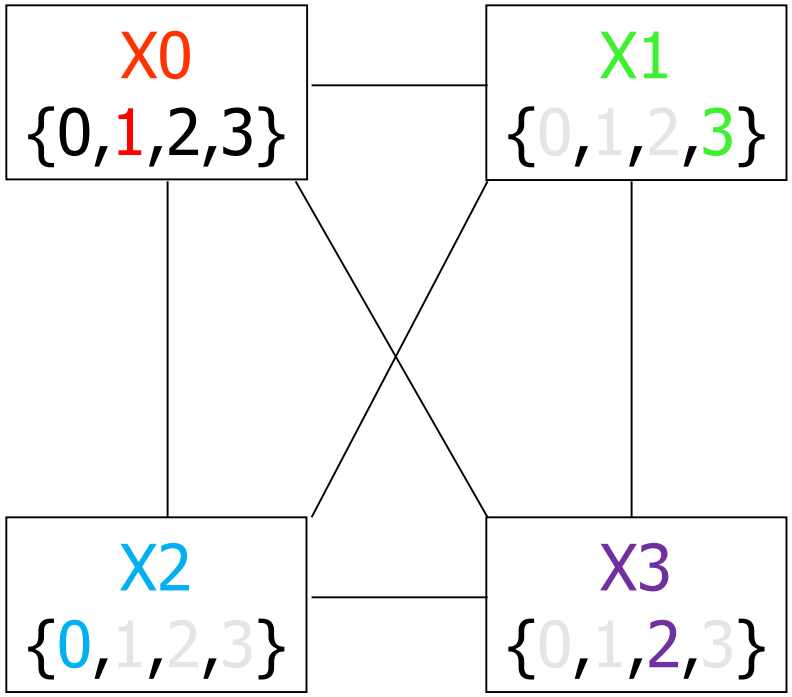




4-Queens Problem



Solution!!!



SEND+MORE=MONEY(MATHEMATICAL MODEL)

- Variables :

  $X = \{S,E,N,D,M,O,R,Y,R1,R2,R3\}$

- Domaines :

  $D(S) = D(M) = \{1,2,3,4,5,6,7,8,9\}$
  $D(E) = D(N) = D(D) = D(O) = D(R) = D(Y) = \{0,1,2,3,4,5,6,7,8,9\}$
  $D(R1) = D(R2) = D(R3) = \{0,1\}$

- Contraintes :
  - Un premier ensemble de contraintes exprime le fait que SEND+MORE=MONEY :

    $C1 = \{ \quad D + E = Y + 10*R1,$
    $R1 + N + R = E + 10*R2,$
    $R2 + E + O = N + 10*R3,$
    $R3 + S + M = O + 10*M \quad \}$

  - Une dernière contrainte exprime le fait que toutes les variables doivent prendre des valeurs différentes. On peut utiliser pour cela la contrainte globale "toutes-différentes" :

    $C2 = \text{toutes-différentes}(\{S,E,N,D,M,O,R,Y\})$