Contents

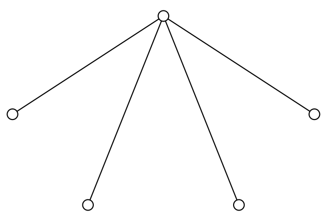
1 Zero Forcing Game

1.1 The game itself

The set of linear equation $\begin{cases} ax + by = 0 \\ a \neq 0, y = 0 \end{cases}$ implies that $x = 0$. We can generalize these condition to:

$$\begin{cases} a_1 x_1 + a_2 x_2 + \cdots + a_n x_n \\ a_1 \neq 0 \,\&\, a_i = 0 \text{ for } i \geq 2 \end{cases}$$

1.2 Trun into Graph



Coloring Rules

1. If a black vertex has exactly one white neighbor, then the white neighbor is forced to be black.
2. Repeat until no more changes occur.

1.3 The Adjacency Matrix

Let $G = (V, E)$ with $V = \{v_1, v_2, \ldots, v_n\}$. The **Adjacency Matrix** $A = (a_{ij})$ of G is

$$a_{ij} = \begin{cases} 1 & \text{if } \{v_i, v_j\} \in E, \\ 0 & \text{otherwise.} \end{cases}$$

e.g. For a path graph $G \in P_n$, the adjacency matrix is

P_4

$$\Rightarrow \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$