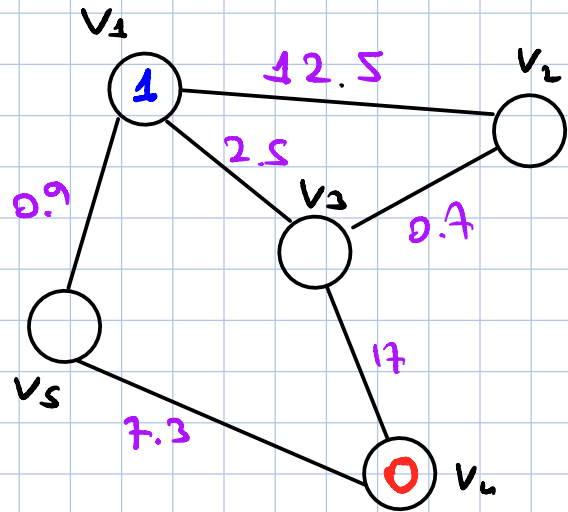


# CLASSIFICATION IN GRAPHS



- Weighted graph -  $(G, w)$
- partial labels - '0' or '1'
- Find labeling for all vertices that 'makes sense'

- Labeled vertices:  $V_L \subset V$
- Unlabeled vertices:  $V_U \subset V$
- looking for:  $f: V \rightarrow \{0, 1\}$

'0'  $\Leftarrow$  below  $\frac{1}{2}$       above  $\frac{1}{2} \Rightarrow$  '1'

## OPTIMISATION PROBLEM:

$$f^* = \operatorname{argmin}_f \left\{ \|M \cdot f\|_2^2 \text{ subject to } \left. \begin{array}{l} f(v_i) = y_i \\ i \in V_L \end{array} \right\} \right.$$

(Annotations: 'incidence matrix' points to  $M$ ; 'given label' points to  $y_i$ ;  $\approx \nabla \cdot f$  is written below the matrix  $M$ )