H — check matrix

y — vector to decode

$L_1(y) = \big(f(y_1), f(y_2), \ldots, f(y_n)\big)$, where

$$f(x) = \begin{cases} 1, & x = 0 \\ -1, & \text{else} \end{cases}$$

$L_2(S) = \big(g(S_1), g(S_2), \ldots, g(S_n)\big)$, where

$$g(x) = \begin{cases} 1, & x < 0 \\ 0, & \text{else} \end{cases}$$

Algorithm

0. **Init**: $M_+ = 0$, $S = L_1(y)$,
1. **Calculate** M^-: $M^-_{ji} = H_{ji}(S_i - M^+_{ji})$,
2. **Calculate** M^+: $M^+_{ji} = H_{ji} \cdot \Big(\min\limits_{k \neq i, H_{jk}=1} |M^-_{jk}| \Big) \cdot \Big(\prod\limits_{k \neq i, H_{jk}=1} \operatorname{sgn} M^-_{jk} \Big)$,
3. **Calculate syndrome**: $S_i = L(y) + \sum\limits_j M^+_{ji}$,
4. **Check syndrome**: if $Hy_i^T = 0$ then **decoded** (result is y_i), else **goto (1)**, where $y_i = L_2(S_i)$.