## Graph representation of parity check matrix



$$
\begin{array}{lllllll}
1 & 1 & 1 & 0 & 1 & 0 & 0 \\
1 & 1 & 0 & 1 & 0 & 1 & 0 \\
1 & 0 & 1 & 1 & 0 & 0 & 1
\end{array}
$$

$x_{1}+x_{2}+x_{3}+x_{5}$
$x_{1}+x_{2}+x_{4}+x_{6}$
$x_{1}+x_{3}+x_{4}+x_{7}$

## Iterative decoding



Received word

## Phase 1: left to right



Send symbols, compute parity

## Phase 2: right to left



Send back symbol that would satisfy parity


Take majority vote, accept if there is a winner

## Phase 1: left to right



Send symbols, compute parity

## Phase 2: right to left



Send back symbol that would satisfy parity


Take majority vote, accept if there is a winner

## Phase 1: left to right



Stop when all checks satisfied


Iteration 0

| 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 0 |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |
| 0 |  |  |  |  |  |  |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 |

Iteration 1
1
1
0
0
0
0
0
0
ans $=$
0
1
1
1
0
0
0

