

Describe the cokernels of the n -by- n matrices A_n and B_n as abelian group. Recall that the cokernel of an n -by- n matrix N_n equals $\mathbb{Z}^n/N_n\mathbb{Z}^n$ and has another interpretation for certain graphs.

- A_n is the n -by- n matrix $\begin{bmatrix} n & -1 & -1 & \cdots & -1 \\ -1 & n & -1 & \cdots & -1 \\ -1 & -1 & n & \cdots & -1 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ -1 & -1 & -1 & \cdots & n \end{bmatrix}$, where $a_{ij} = -1$

when $i \neq j$ and $a_{ii} = n$.

- B_n is the n -by- n matrix ($n \geq 3$) $\begin{bmatrix} 2 & -1 & 0 & \cdots & 0 & -1 \\ -1 & 2 & -1 & \cdots & 0 & 0 \\ 0 & -1 & 2 & \ddots & 0 & 0 \\ \vdots & \vdots & \ddots & \ddots & \ddots & \vdots \\ 0 & 0 & 0 & \ddots & 2 & -1 \\ -1 & 0 & 0 & \cdots & -1 & 2 \end{bmatrix}$, where

each row of $b_{ii} = 2$, $b_{i,i\pm 1 \pmod n} = -1$ and $b_{ij} = 0$ otherwise.