

18 April 2024


BETTI NUMBERS OF A SIMPLICIAL COMPLEX

β_j is the number of j -dimensional holes

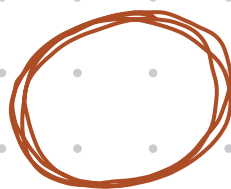
$$\beta_j = \text{nullity}(\partial_j) - \text{rank}(\partial_{j+1})$$

where ∂_j is the matrix that encodes the boundaries of all j -dimensional simplices

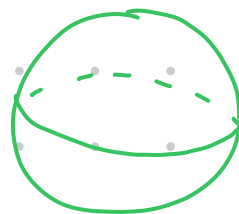
$$\beta_j = \left[\begin{array}{l} \text{num. columns} \\ \text{of } \partial_j \end{array} - \text{rank}(\partial_j) \right] - \text{rank}(\partial_{j+1})$$



connected
components
0-dimensional
holes



1-dimensional
hole



2-dimensional
hole