

hypergraphs

**A GAP package to work with
hypergraphs**

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Chapter 1

Hypergraph Objects

1.1 Hypergraph

Chapter 2

Basic Constructions

2.1 Hypergraphs

2.1.1 HHypergraph (for list of vertices and edges)

- ▷ `HHypergraph(V , Ed)` (method)
- ▷ `HHypergraph(Ed)` (method)

Returns the hypergraph object, with vertices V and hyperedges Ed . In the second form, the hyperedges determine the set of vertices, as the union of the hyperedges.

2.1.2 HCompleteHypergraph

- ▷ `HCompleteHypergraph(n , r)` (function)

Returns the hypergraph that has $\{1 \dots n\}$ as set of vertices, and all r -subsets of $\{1 \dots n\}$ as hyperedges.

2.1.3 HRandomUniformHypergraph

- ▷ `HRandomUniformHypergraph(n , r , p)` (function)

Returns a hypergraph with set of vertices given by $\{1 \dots n\}$, and where each r -subset of $\{1 \dots n\}$ appears as a hyperedge with probability p .

2.1.4 HRemovedEdge

- ▷ `HRemovedEdge(H , e)` (function)

Returns the graph obtained from the hypergraph H removing its edge e .

2.1.5 HRemovedVertex

- ▷ `HRemovedVertex(H , x)` (function)

Returns the hypergraph obtained from the hypergraph H by removing the vertex x from its list of vertices and from each of its edges. It also removes edges that become empty as a result.

2.2 Properties

2.2.1 IsUniform

▷ `IsUniform(H)` (method)

Determines if the hypergraph H is uniform, that is, if all edges of H have the same cardinality k . If H is uniform, then the function returns k , otherwise, it returns false.

2.2.2 IsSimple

▷ `IsSimple(H)` (method)

Determines whether the hypergraph H is simple. (A hypergraph is simple if no edge is contained in another edge.)

2.2.3 IsConnected

▷ `IsConnected(H)` (method)

Determines whether the hypergraph H is connected.

2.3 Parameters

2.3.1 HDistance

▷ `HDistance(H , x , y)` (function)

Given a hypergraph H and two of its vertices x , y , this function returns the distance in H from x to y .

2.3.2 HDiameter

▷ `HDiameter(H)` (method)

Returns the diameter of the hypergraph H .

2.3.3 HGirth

▷ `HGirth(H)` (method)

Returns the girth of the hypergraph H .

2.4 Lists

2.4.1 Vertices

▷ `Vertices(H)` (method)

Returns the list of vertices of the hypergraph H .

2.4.2 Edges

▷ `Edges(H)` (method)

Returns the list of edges of the hypergraph H .

2.4.3 HNeighborhood

▷ `HNeighborhood(H , x)` (function)

Given a hypergraph H and one of its vertices x , returns the set of vertices that share an edge with x .

2.4.4 HDistancesFrom

▷ `HDistancesFrom(H , x)` (function)

Given a hypergraph H and one of its vertices x , it returns a record L , where $L.u$ is equal to the distance in H from the vertex x to the vertex u .

2.4.5 IndexOfEdges

▷ `IndexOfEdges(H)` (method)

Given a hypergraph H , the function returns a record I , where $I.u$ is a list of the indices of the edges where the vertex u appears.

Chapter 3

Library of Hypergraphs

3.1 Hypergraphs

3.1.1 HFano

▷ HFano

(global variable)

The Fano hypergraph.

3.1.2 HQuad

▷ HQuad

(global variable)

The hypergraph of the smallest generalized quadrangle.

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