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Faculty of Mathematics and Computer Science

Department: Computer Science

Module:Graph Theory/DCSO

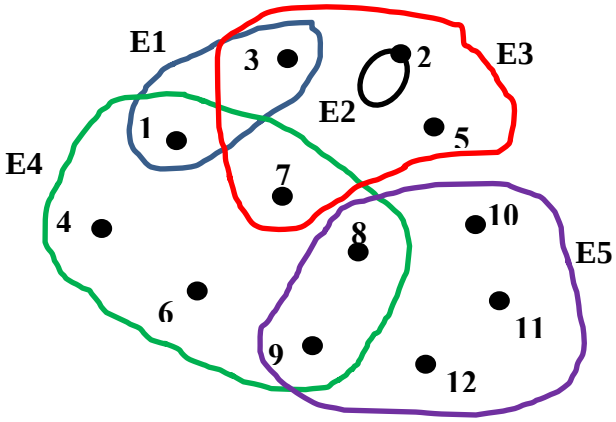
TUTORIALS - SERIES NO. 05 (CORRECTION)

Exercise 01

X = {1, 2, …, 12}; E = {E1, E2, E3, E4, E5}

With: E1 = {1, 3}; E2 = {2}; E3 = {2, 3, 5, 7}; E4 = {1, 4, 6, 7, 8, 9}; E5 = {8, 9, 10, 11, 12}

Proposal for a representation of the hypergraph H(X, E)



Exercise 02

The incidence matrix of H(X, E)

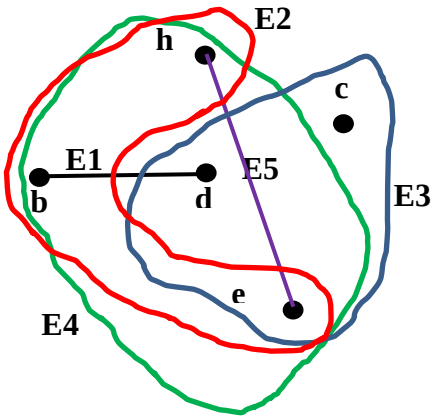
	E1	*E2*	*E3*	*E4*	*E5*
has	0	1	0	1	1
b	1	1	0	1	0
c	0	0	1	0	0
d	1	0	1	1	0
e	0	1	1	1	1

1. X = {a, b, c, d, e} ;

   E = {E1, E2, E3, E4, E5} = {{b, d}, {a, b, e}, {c, d, e}

   {a, b, d, e}, {a, e}}

2. Graphic representation of H



Exercise 03

Let the hypergraph H(X, E) be represented by the figure below

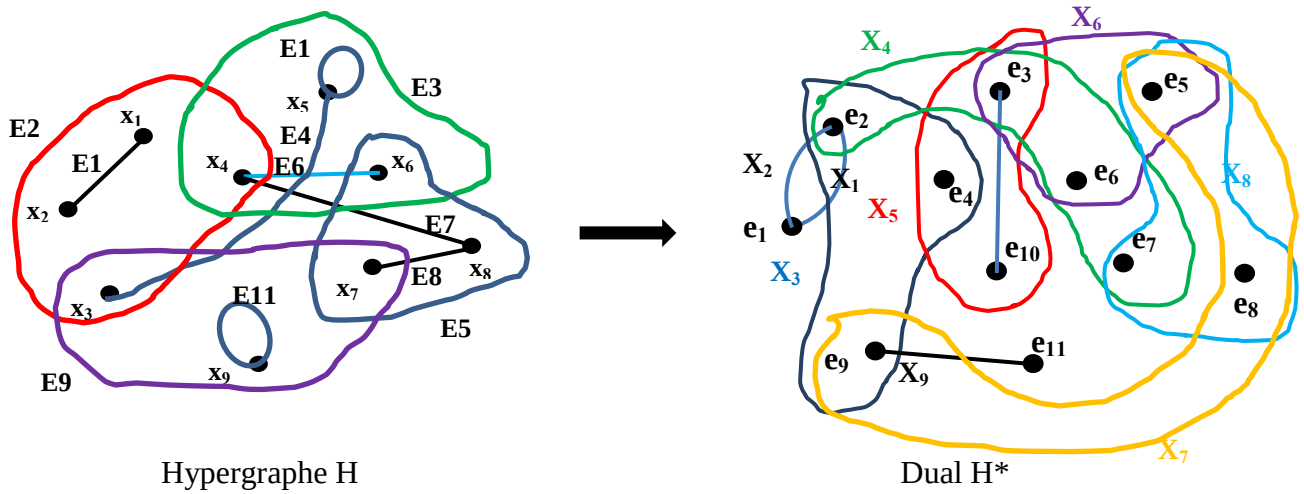
1. The components X and E of H

   X = {x_1, x_2, …, x_9}

   E = {E1, E2, …, E11} with:

2. *E1 = { x_1, x_2} ; E2 = { x_1, x_2, x_3, x_4} ; E3 = { x_4, x_5, x_6} ; E4 = { x_3, x_5} ; E5 = { x_6, x_7, x_8} ;*
3. *E6 = { x_4, x_6} ; E7 = { x_4, x_8} ; E8 = { x_7, x_8,} ; E9 = { x_3, x_7, x_9} ; E10 = { x_5} ; E11 = { x_9}*

4. Give the dual graph H* associated with H



Hypergraphe H Dual H*

Exercise 04

The parameters of the hypergraph H(X, E) from exercise 03 are:

1. The order and size of H

   The order of H is n(H) = |X| = 9

   The size of H is m(H) = |E| = 11

2. The rank and anti-rank of H

   The rank of H is r(H) = Maxj|Ej| = |E2| = 4

   The anti-rank of H is $\delta(H) = Min_j|E_j| = |E11| = 1$

Good luck