Exercises for Statistical analysis of network data-Sheet 10

1. Refer to Figure 1 for this question, and address the exercise for each of the three hypergraphs (a-c).

   (a) Find the order and number of edges in the hypergraphs (a-c) in Figure 1.

   (b) Find the included edges (if any).

   (c) Find the multiple edges (if any).

   (d) Is the hypergraph simple?

   (e) For each pair of vertices labelling them if necessary, determine if they are adjacent.

   (f) For each vertex determine the degree and the vertex neighbourhood.

   (g) For each edge find the size.

   (h) Find the maximum degree of each of the three hypergraphs.

   (i) Are the hypergraphs regular?

   (j) Are the hypergraphs uniform?

   (k) Determine the rank of the hypergraphs.

   (l) Find isolated (no edges) and pendant (only one edge connecting to another node) nodes. If such can be found.

   (m) Find any singleton or empty edges.

   (n) For subplot (c) name the vertices and edges, re-draw the hypergraph, and show an isomorphism to a different labelling.

   (o) For subplot (c) calculate its incidence matrix, and determine its dual. Draw its dual.

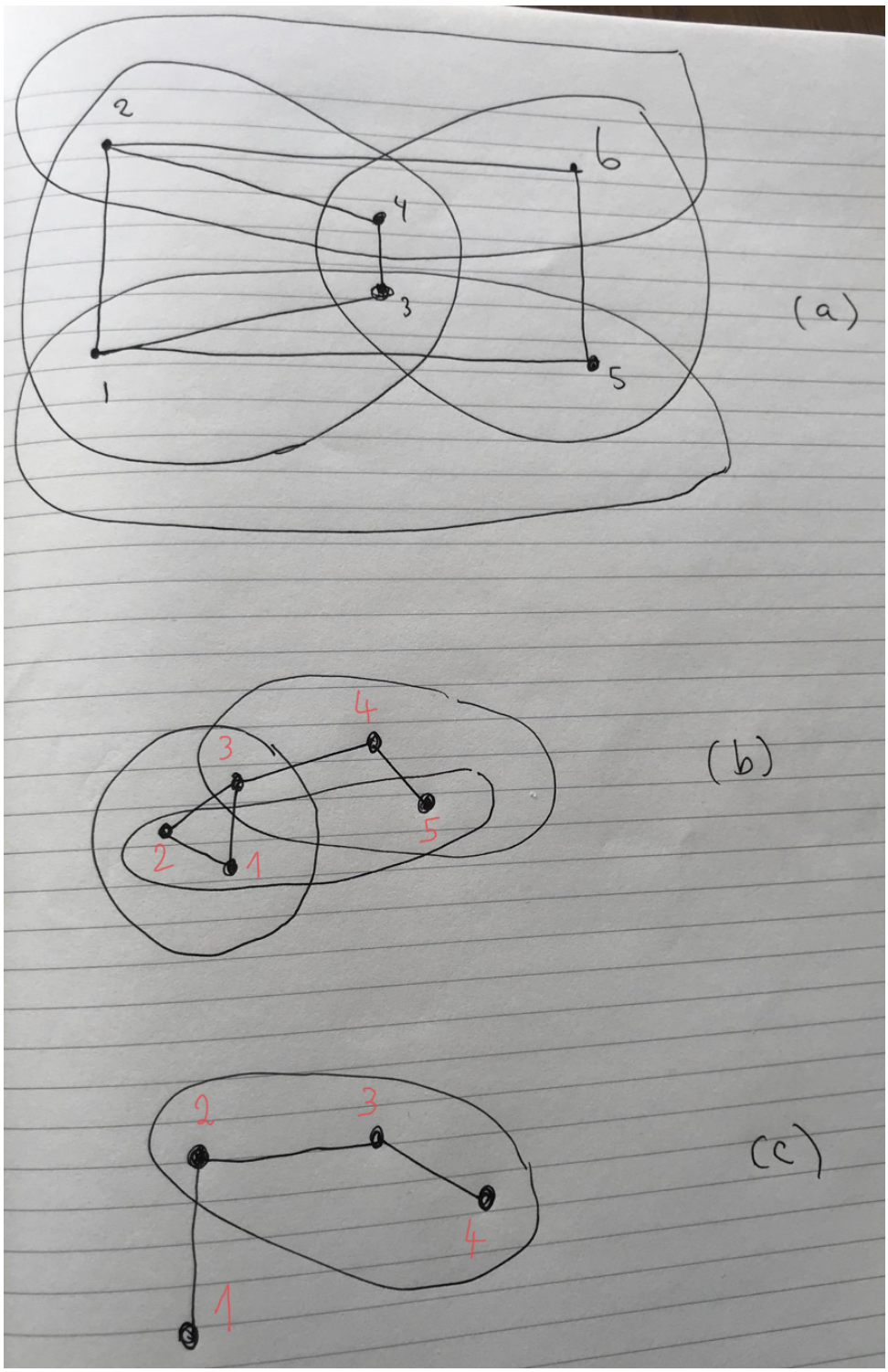

Figure 1: Three hypergraphs labelled from (a) to (c).