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**Topology**

Winter term 2021/2022

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## Exercise Session Sheet 0

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**Exercise 1** Recall the notions (undirected finite) *graph*, *cycle*, *forest* and *tree*.

**Exercise 2** Show that  $e(T) = v(T) - 1$  holds for any tree  $T$ .

**Exercise 3** Show  $e(G) \geq v(G) - 1$  for any connected graph  $G$  with equality iff  $G$  is a tree.

**Exercise 4** Show that any connected undirected graph contains a spanning tree.

**Exercise 5** Find a spanning tree for the edge graph of the octahedron.

**Exercise 6** Find a spanning tree for the edge graph of the 'Pentagon push through' surface of the lecture (Homework).

**Exercise 7** Draw the dual graph of the octahedron (seen as a cell complex).

**Exercise 8** Give a set-theoretic (inner and outer) description of the cube and the octahedron from the lecture.

**Exercise 9** Why didn't you do any topology in linear algebra? In your calculus class you did. Recall your favourite result.