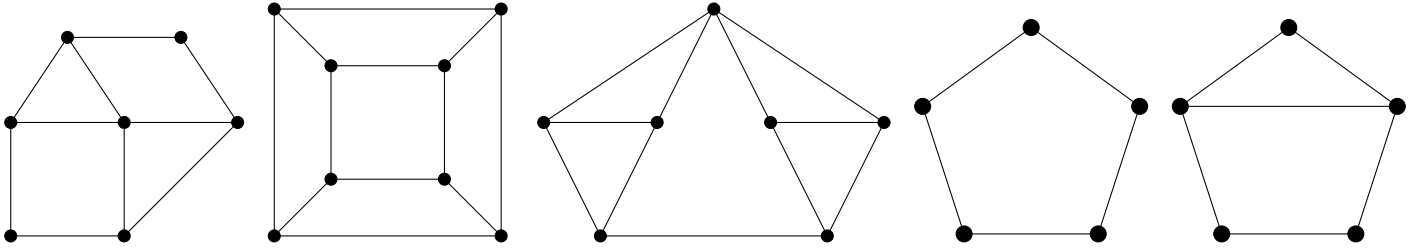


**Exercise 1**

Among the following graphs, find which ones are minors of which other ones.



For each pair where none is the minor of the other one, what is a largest (in terms of the number of edges) common minor of the two graphs?

**Exercise 2**

Find two graphs  $G$  and  $H$  such that  $H$  is a minor of  $G$  and  $\chi(G) < \chi(H)$ .

Find two graphs  $G$  and  $H$  such that  $H$  is a minor of  $G$  and  $\chi(G) > \chi(H)$ .

**Exercise 3**

Find a structural characterization of the class of  $C_4$ -minor-free graphs.

**Exercise 4**

Let  $D$  denote the *diamond* – the graph obtained from  $K_4$  by deleting one edge. Find a structural characterization of the class of  $D$ -minor-free graphs. Are they all planar? Are they all outerplanar?

**Exercise 5**

Let  $H$  and  $H'$  be two graphs. Let  $\mathcal{C}$  and  $\mathcal{C}'$  denote the classes of  $H$ -minor-free and  $H'$ -minor-free graphs, respectively.

If  $H$  is a subgraph of  $H'$ , is there a relation of inclusion between the classes  $\mathcal{C}$  and  $\mathcal{C}'$  in one sense or the other?

If  $H$  is a minor of  $H'$ , is there a relation of inclusion between the classes  $\mathcal{C}$  and  $\mathcal{C}'$  in one sense or the other?

**Exercise 6**

Does the class of triangle free graphs (that is where triangles are forbidden as an induced subgraph) admit a finite number of minimal forbidden minors?

What about the class of  $P_3$ -free graphs (that is where the path on three vertices is forbidden as an induced subgraph)?