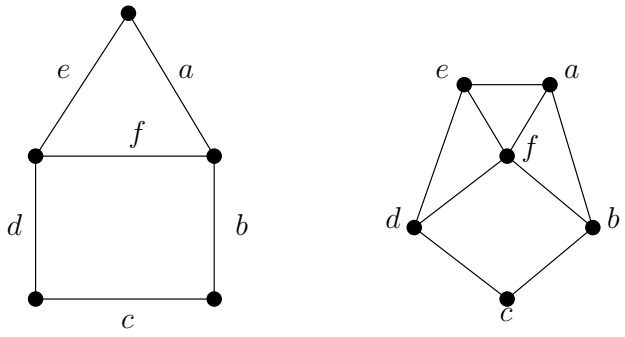
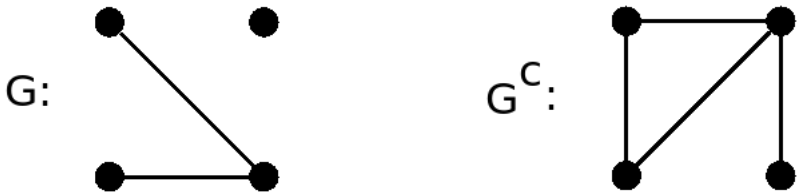
Problem sheet 1

1.



2. Re-reading the definition of the complement, it means that you put in G^c exactly the edges that are missing from G.

   (a)



   (b) In K_n you have all possible edges, so there are no missing edges. So in K_n^c you only have n vertices with no edges between them.

3. (a) No, because the number of vertices of odd degree must be even.

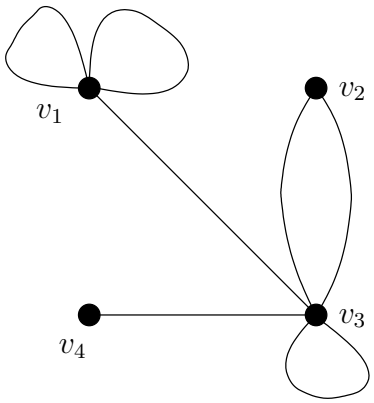
   (b) Yes (try to make a picture of it).

   (c) No: Start with the vertices of degree 4: All 3 of them are linked to all other vertices, which means that every vertex has degree at least 3.

   (d) No: One vertex has degree 4, which is impossible since there are only 3 other vertices.

4. (a) See next question for an example.

   (b) Let v_1, v_2, v_3, v_4 be the vertices of this graph. The first column gives the number of edges between v_1 and $v_1, \ldots, v_4$, the second column the number of edges between v_2 and $v_1, \ldots, v_4$, etc. A possible drawing for this graph is


v_1
v_2
v_3
v_4