

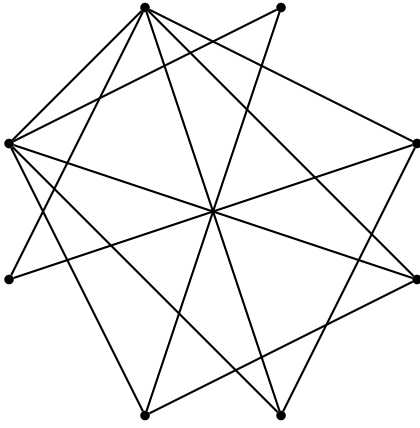
Chapter V

GRAPHS

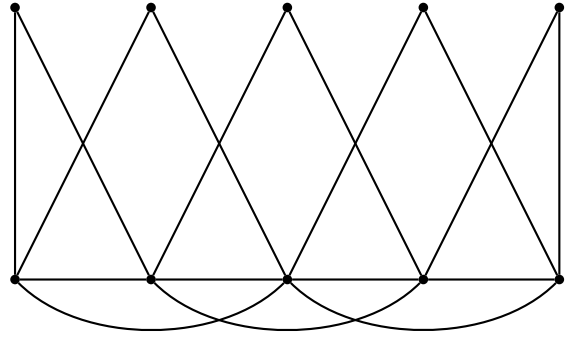
List of exercises 12

Graphs

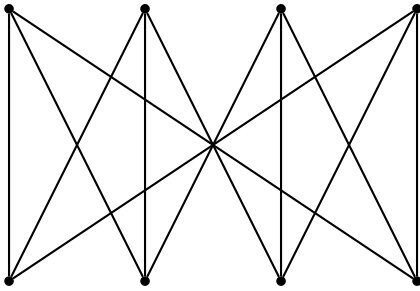
1. Translate the salutes lemma into suitable terms of graph theory.
2. Draw K_1 , K_2 , K_3 , K_4 , K_5 and K_6 . How many edges has the complete graph K_n ?
3. Answer to the questions giving an example if in the affirmative or an explanation if in the negative:
 - (a) Is there a regular graph of order 4 with 10 edges?
 - (b) And with 15 edges?
4. How many labeled trees are there whose vertices v_1 and v_2 have degree 3 and vertices v_3, v_4, v_5 and v_6 have degree 1? Draw the results.
5. Is there any tree with 4, 4, 4, 3, 2, 1, 1, 1, 1, 1, 1, 1, 1 as the degrees of the vertices? Draw in the affirmative.
6. Consider the trees with $n = 5$ vertices.
 - a) How many types are there? Explain.
 - b) How many labeled trees are there of each type?
 - c) How much is the total? Check that Cayley's formula is satisfied.
7. How many ordered rooted trivalent trees of order 4 are there? Draw.
8. How many ordered rooted trees with 5 vertices are there? Draw.
9. Prove that graphs (a), (b), (c), (d), (e) and (f) are planar, that is, draw the graphs in such a way that pairs of edges intersect only at vertices, if at all. Check Euler's formula.
10. Determine the chromatic number of the political map of Australia.
11. Determine the chromatic number of the political map of Africa.



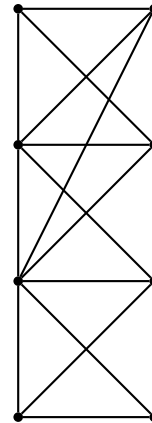
(a)



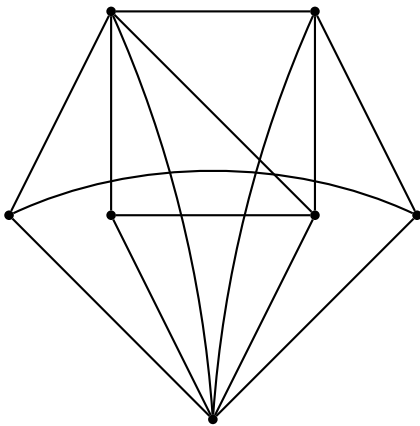
(b)



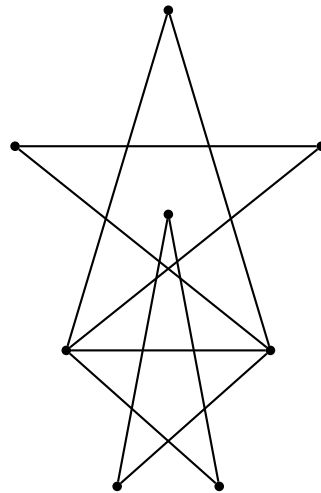
(c)



(d)



(e)



(f)

