

Math415 Graph Theory: Assignment 1 2005

Please show all working and reasoning to get full marks for any question.

- Using valency sequence reduction, find all different 4-regular graphs with less than 7 vertices.
- Calculate the complement of each of the above graphs and thus, without doing any more valency sequences, deduce how many 4-regular graphs there are with 7 vertices and draw them.
- Draw your graph with as few edges crossing as you can and create its deck on 8 pieces of paper. By considering the deck of G prove the two graphs are not isomorphic.

$G1:= \{fc, bc, ec, hc, fi, bi, ei, hi, fd, bd, ed, hd, fg, bg, eg, hg\}$

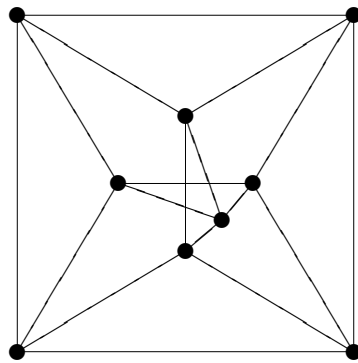
$G2:= \{fh, fc, bc, ec, fi, bi, ei, hi, fd, bd, ed, hd, bg, eg, hg, cg\}$

$G3:= \{fe, bh, fc, bc, ec, fi, ei, hi, fd, bd, hd, cd, bg, eg, hg, ig\}$

$G4:= \{fe, bh, bc, hc, fi, bi, ei, hi, fd, bd, ed, cd, fg, eg, hg, cg\}$

$G:= \{fe, bh, fc, bc, ec, fi, bi, hi, fd, ed, hd, cd, bg, eg, hg, ig\}$

- Prove that this graph is self-complementary:



- The basic operation for building 4-regular graphs is removing two edges then adding a vertex and joining it to the four vertices from the two removed edges.

Determine the other operations which may become necessary to not create multiple edges when undoing this operation.