

HOMEWORK 4 (MATH 180, SPRING 2014)

Read: MN, sections 4.1-3. Note: we will skip adjacency matrices in §4.2 and returned to them later in the course.

Solve: Exercise 1 a), 6 in Section 4.1, and 15 a) in Section 4.3.

I. Let $n = 13$. Compute the number of subgraphs of K_n isomorphic to

- a) P_3
- b) P_5
- c) C_3
- d) C_5
- e) K_6
- f) $K_{3,1}$
- g) $K_{3,2}$
- h) $K_{3,3}$
- i) O_9
- j) P_{13}
- k) C_{13}

II. Let $r = 7$. Compute the number of subgraphs of $K_{r,r}$ isomorphic to

- a) P_3
- b) P_5
- c) C_3
- d) C_4
- e) C_6
- f) $K_{3,1}$
- g) $K_{3,2}$
- h) $K_{3,3}$
- i) O_9
- j) P_{14}
- k) C_{14}

III. Find all graphs (up to isomorphism) with score $(3, 3, 3, 3, 3, 3, 6)$. Prove that no other such graphs exist. Same question for graphs with score $(3, 3, 3, 3, 3, 3)$.

IV. Suppose graph G has score $(8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 8, 10, 12)$. Prove that G has a subgraph isomorphic to P_9 .

V. a) Describe all graphs (up to isomorphism) which contain no subgraph isomorphic to P_2 .
b) Same question for P_3 .

This Homework is due Wednesday April 30, at 12:59:59 pm. (right before class). Please read the collaboration policy on the course web page. Make sure you write your name in the beginning and your collaborators' names at the end. You MUST box all answers. Remember that answers are not enough, you also need to provide an explanation exhibiting your logic.

P.S. Problems I and II are worth 22 points, others 10 points.