

Complete all of the following problems and hand in your solutions to your tutor by 1:50pm on Tuesday 23 September, 2003. **Make sure that your name and student number are on each sheet of your answers.** Solutions to all the problems will be distributed later.

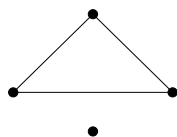
Completing 5 out of the 6 assignments is compulsory and each of the five assignments will contribute 4% towards your final grade. Late assignments will not be accepted unless you have a very good excuse.

1. Complete the following problems from the textbook:

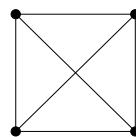
- Section 11.1, pages 616-619: Questions 9, 17, 18, 37de
- Section 11.2, pages 636-640: Questions 2abd, 15, 16
- Section 11.3, pages 654-656: Question 22a
- Section 11.5, pages 681-683: Questions 15, 16, 18

2. In each of the following cases, state whether or not the graph H is a subgraph of the graph G and give a brief explanation of your answer.

(a)

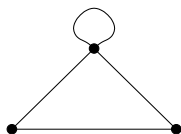


H

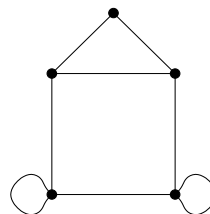


G

(b)

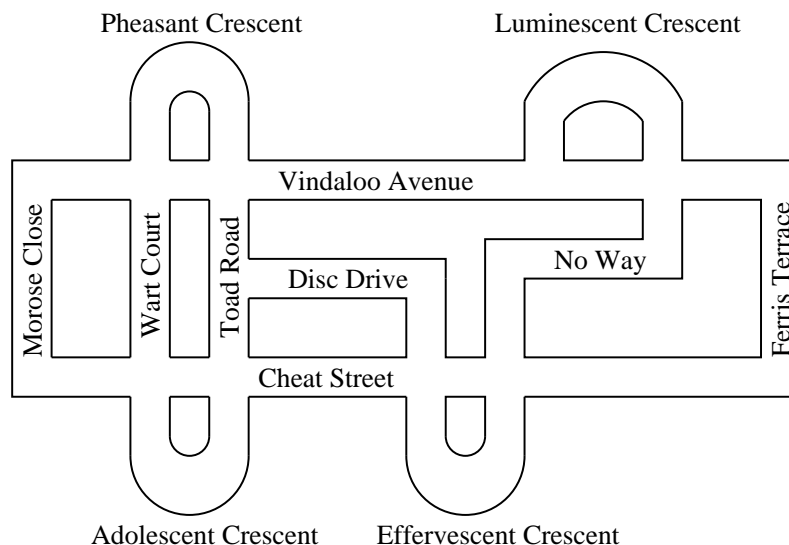


H



G

3. A postman is trying to determine an efficient way to deliver the mail along his route. He must deliver mail along each of the streets in the following map. (Assume that there are houses only on one side of each street, so he need only walk along each street once to deliver the mail.)



(a) Explain why the postman cannot deliver the mail by walking along each street exactly once and finish at the same place he started.

(b) The postman has arranged to be dropped off at one point along his route and picked up at another point. Where should he be dropped off and picked up, and in what order should he walk the streets so that he delivers the mail by walking along each street precisely once?

4. Complete the following problems from the textbook:

- Section 10.1, pages 544–546: Questions 2, 24
- Section 10.2: pages 554–555: Questions 13, 24
- Section 10.3: pages 570–572: Question 3
- Section 10.5: pages 599–601: Questions 1cd, 7

5. Define the relation S on the set of integers as follows:

$$\forall a, b \in \mathbb{Z}, \quad a S b \quad \text{if, and only if,} \quad a \equiv b \pmod{4}.$$

(a) Prove that S is an equivalence relation.

(b) Describe the equivalence classes of S .