姓名： 林凡琪 　　 **学号：** *211240042*

评分： ＿＿＿＿＿ 　　 **评阅：** ＿＿＿＿＿

2023 年 2 月 5 日

1　作业（必做部分）

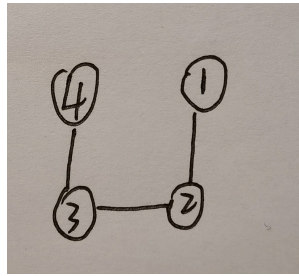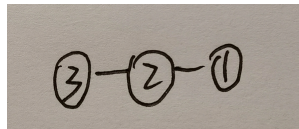**题目 1 (CZ 6.4)**

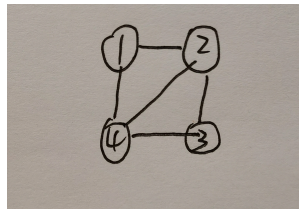**解答：**
(a)
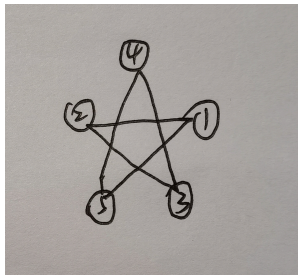
(b)
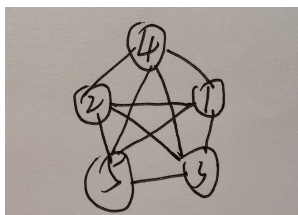
(c)

(d)

(e)

题目 2 (CZ 6.6)

解答:
If n is connected to k regular graph G is not a Euler chart, it is known that k is odd,
and it can be known that n can only be even.
Then in $\overline{G}$, the degree of each point is $n - k - 1$, which is an even number.
Therefore, if $\overline{G}$ is connected, it is a regular graph.

题目 3 (CZ 6.10)

解答:
(i) When G is Hamiltonian:
$\forall x, y \in V(G) \wedge (x, y) \notin E(G)$
$\rightarrow deg(x) + deg(y) \geq 6 + 6 = 12 \geq 10$

(ii) When G-v is Hamiltonian:
$\forall x, y \in V(G - v) \wedge (x, y) \notin E(G - v)$
$\rightarrow deg(x) + deg(y) \geq 5 + 5 = 10 \geq 9$

(iii) When G-v-u is Hamiltonian:

$\forall x, y \in V(G - v - u) \wedge (x, y) \notin E(G - v - u)$
$\rightarrow deg(x) + deg(y) \geq 4 + 4 \geq 8$

题目 4 (CZ 6.12)

解答:
(a) The nodes in $G + H$, if originally in G, is 14 in the new figure; If it was originally in H, it is 16 in the new figure; So it is *Eulerian*
(b) For any two nonadjacent nodes u, v in $G + H$, there is $deg(u) + deg(v) \geq 14 + 14 \geq 23$. Hence it is *Hamiltonian*
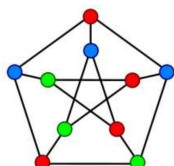

题目 5 (CZ 6.20)

解答:
(a) Proof by contradiction.
Suppose there is a secant point S in G, and from the inscription, we can see that there is a Hamiltonian path starting with S, let the path be $S, x_1, x_2, .., T$. Then after deleting S, there is still a path $x_1, x_2, .., T$, so that the remaining points are connected. Therefore, S is not a cut point, which contradicts the assumption.
(b) A counterexample

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2   Open Topics

Open Topics 1 (竞赛图)
底图是完全图的有向图称为竞赛图。请证明: 竞赛图一定含有有向哈密尔顿通路

Open Topics 2 (循环赛排名)
请你给出一种合理的循环赛排名方法

3   反馈