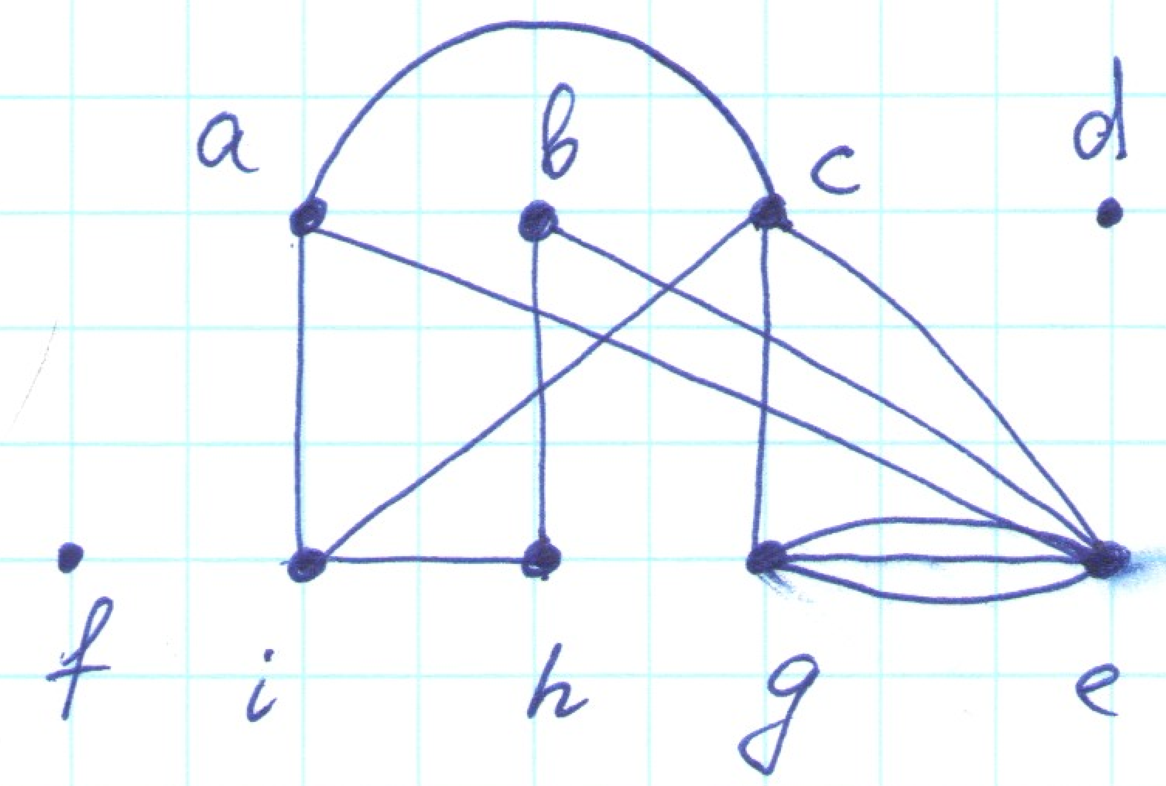
CS135 Section 10.2



p. 665/3 $|V| = \cancel{8}\ 9$

$m = |E| = 12$

$deg(a) = 3$, $deg(b) = 2$, $deg(c) = 4$,

$deg(d) = 0$ isolated vertex, $deg(e) = 6$, $deg(g) = 4$, $deg(h) = 2$, $deg(i) = 3$

$deg(f) = 0$, f is isolated vertex

p. 665/5 $|V| = 15$ $deg(v) = 5$, $\forall\, v \in V$

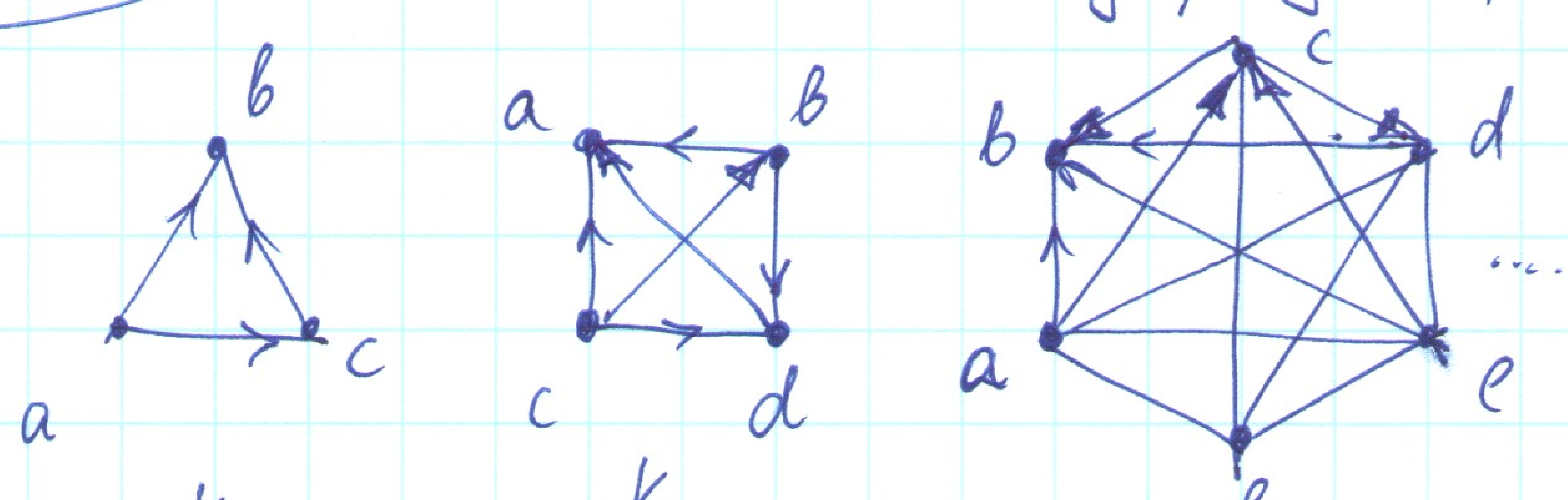
by the handshaking theorem

$$2m = \sum_{v \in V} deg(v) = \sum_{i=1}^{15} 5 = 5 \cdot 15 = 125$$

even odd

No, it cannot

p. 665/17 round robin: every player plays with all other players



K_3 K_4 K_6.

these are complete graphs

so for any vertex $v \in V$ $deg^-(v) + deg^+(v) = |V| - 1$

~~wins~~ losses ~~losses~~ wins plays with all other players

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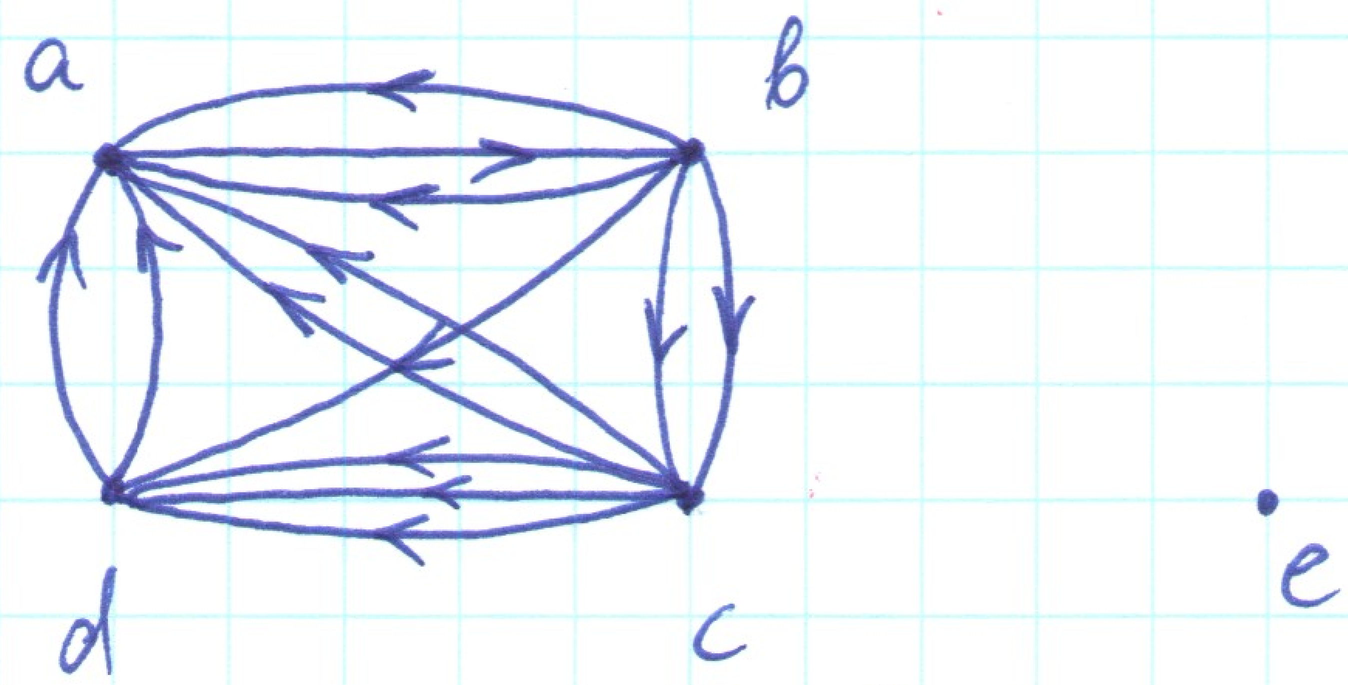
p. 665/9



$|V| = 5$

$|E| = 13$

in-degree	out-degree
$\deg^-(a) = 6$	$\deg^+(a) = 1$
$\deg^-(b) = 1$	$\deg^+(b) = 5$
$\deg^-(c) = 2$	$\deg^+(c) = 5$
$\deg^-(e) = 0$	$\deg^+(e) = 0$
$\deg^-(d) = 4$	$\deg^+(d) = 2$

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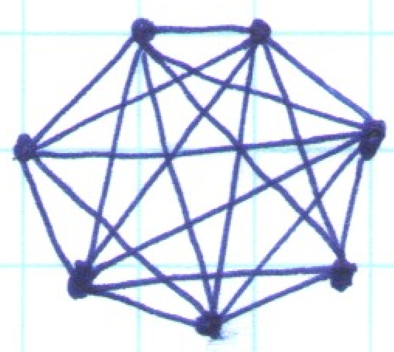
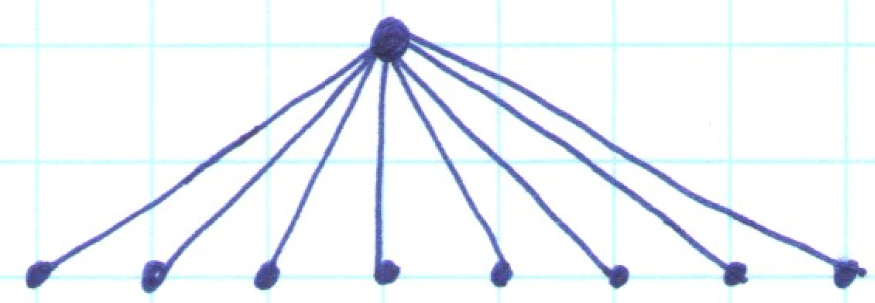
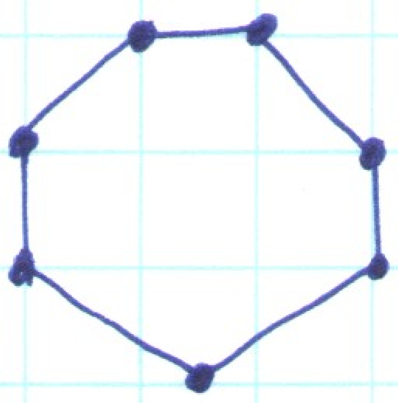
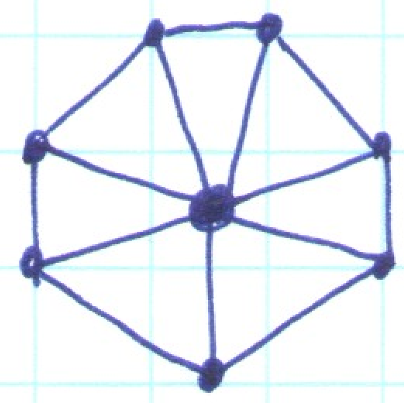
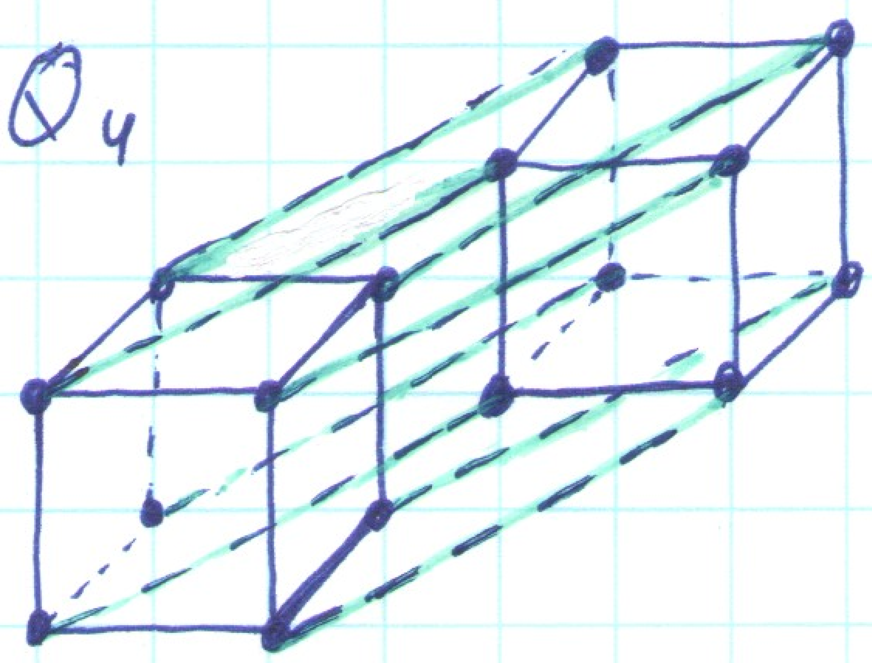
p. 665/20

a) K_7 

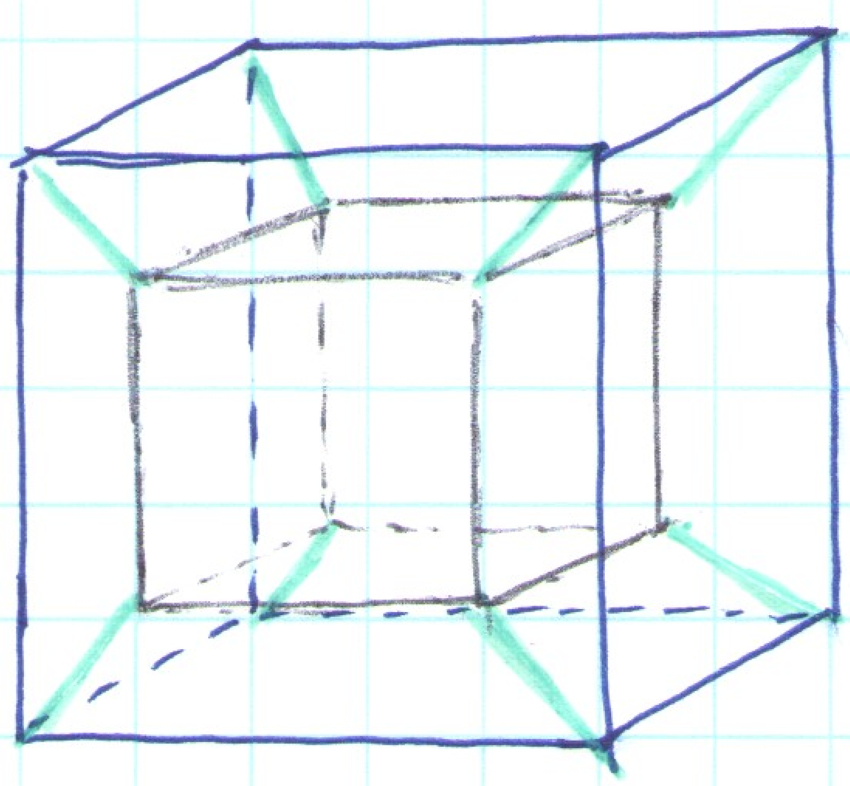
b) $K_{1,8}$ 

d) C_7 

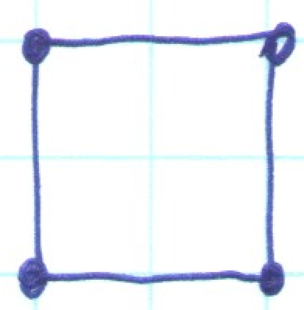
e) W_7 

f) Q_4 

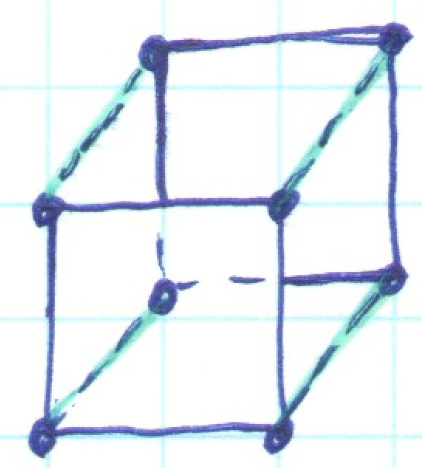
or



this is similar to transition from Q_2 to Q_3:

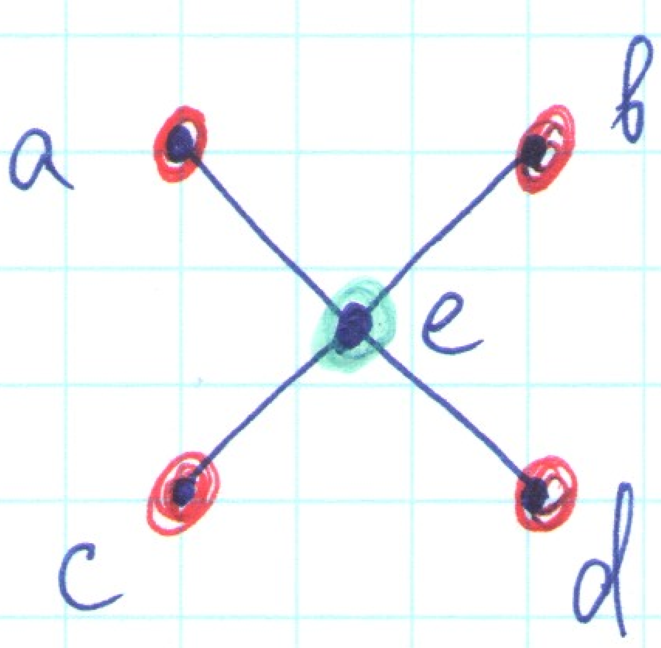


Q_2



Q_3

p. 665/21 determine whether the graph is bipartite

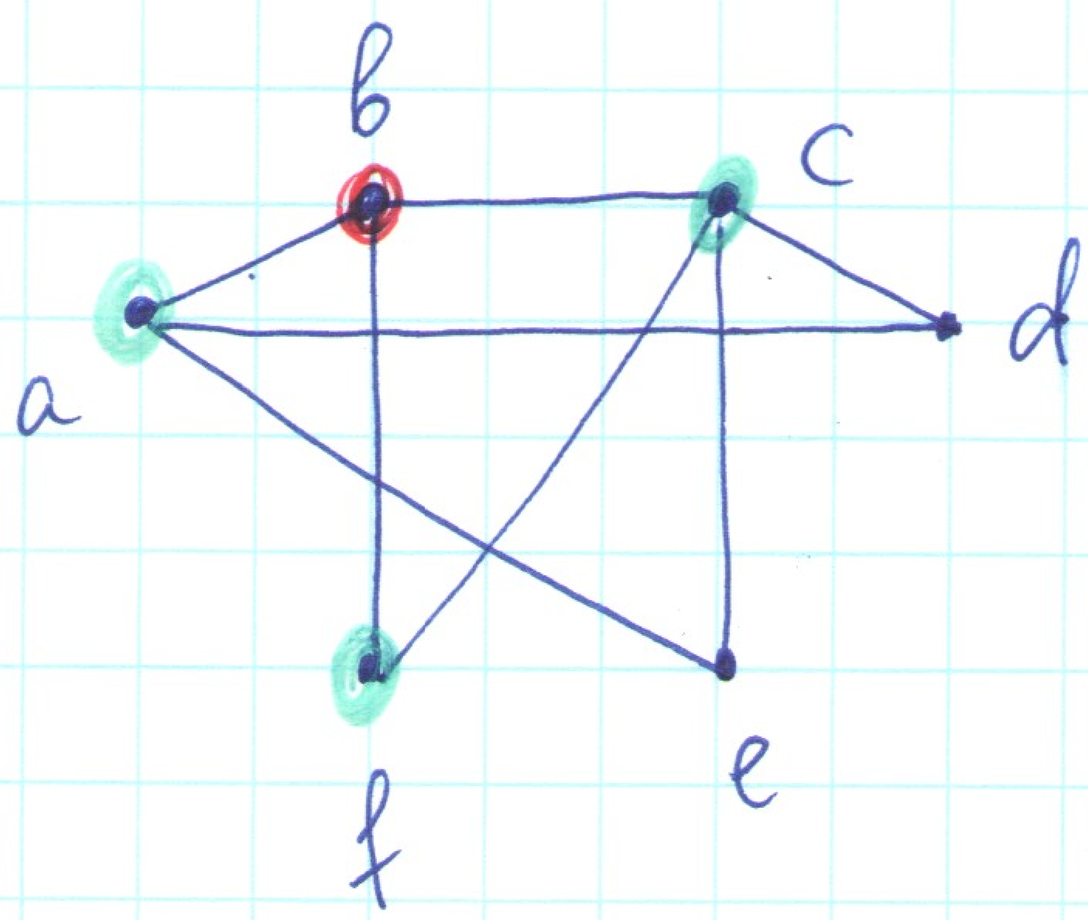


- start by marking a with red
- then mark e green
- then mark c, b, and d red

The graph is bipartite

$V_1 = \{a, b, c, d\}$, $V_2 = \{e\}$

determine whether the graph is bipartite.



- start with b marked red
- then mark a, c, f green
- then mark e, d, STOP!

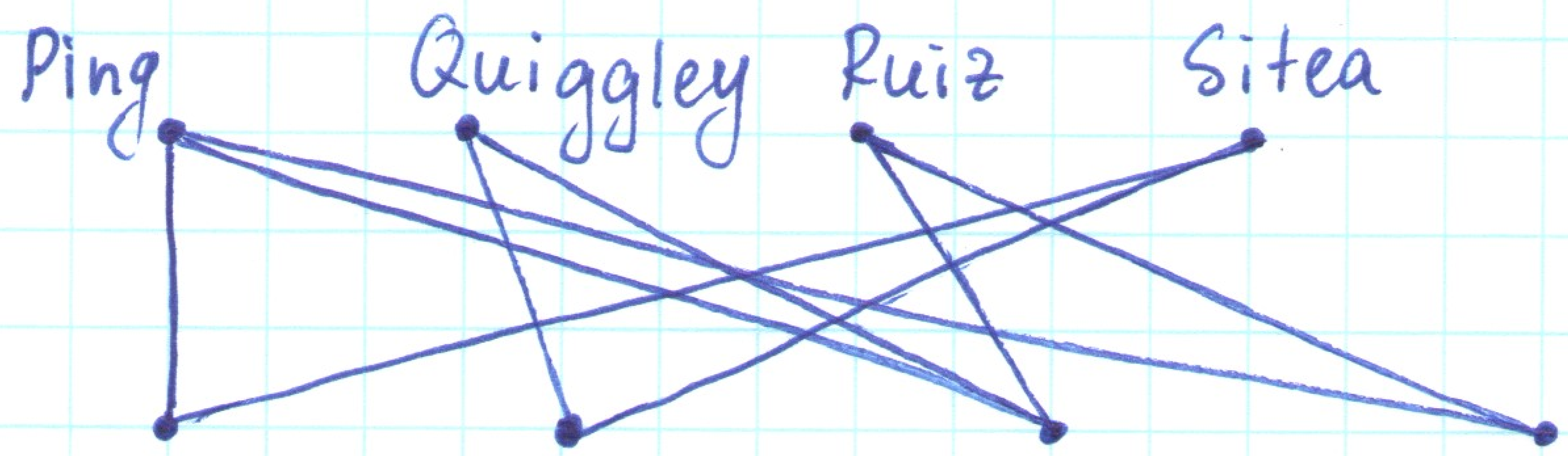
c and f are adjacent, and have the same color!, hence

The graph is not bipartite

p. 666/27 support group: 4 people

areas: hardware, software, networking, wireless.

a)



b) according to Hall's theorem a bipartition exists iff

$$\boxed{|N(A)| \geq |A| \text{ for } \forall A \subseteq V_1}$$

we will have to check this inequality for all possible subsets of V_1

$V_1 = \{$ Ping, Quiggley, Ruiz, Sitea $\}$

1) let $A = \{\text{Ping}\}$, hence $|A| = 1$ $|N(A)| = 3 > 1$ ✓ $3>1$
2) let $A = \{\text{Quiggley}\}$, hence $|A| = 1$ and $|N(A)| = 2 > 1$ ✓ $2>1$
3) let $A = \{\text{Ruiz}\}$, hence $|A| = 1$ and $|N(A)| = 2 > 1$ ✓ $2>1$
4) let $A = \{\text{Sitea}\}$, hence $|A| = 1$ and $|N(A)| = 2 > 1$ ✓ $2>1$
5) let $A = \{\text{Ping, Quiggley}\}$, hence $|A| = 2$ and $|N(A)| = 3+2 = 5 > 2$ ✓ $5>2$

6) let $A = \{Ping, Ruiz\}$ hence $|A| = 2$ and

$|N(A)| = 3 + 2 = 5 > 2$ $5 > 2$

7) let $A = \{Ping, Sitea\}$ hence $|A| = 2$ and

$|N(A)| = 3 + 2 = 5 > 2$ $5 > 2$

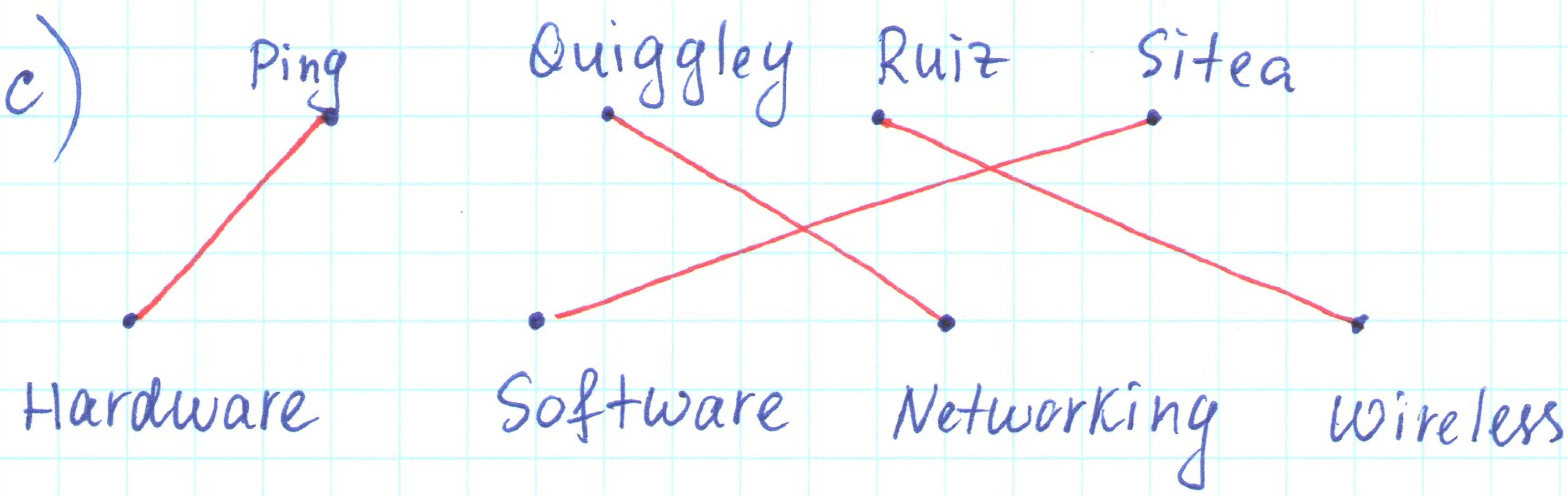
8) let $A = \{Quiggley, Ruiz\}$, hence $|A| = 2$ and

$|N(A)| = 2 + 2 = 4 > 2$ $4 > 2$

and so forth .... there will be 7 more checks

and all of them will yield true inequalities (because each person in a group has 2 or more quallifications, so with addition of a person, the neighborhood increases by 2 or 3)

c)



Note that this is one of a number of possible assignments.