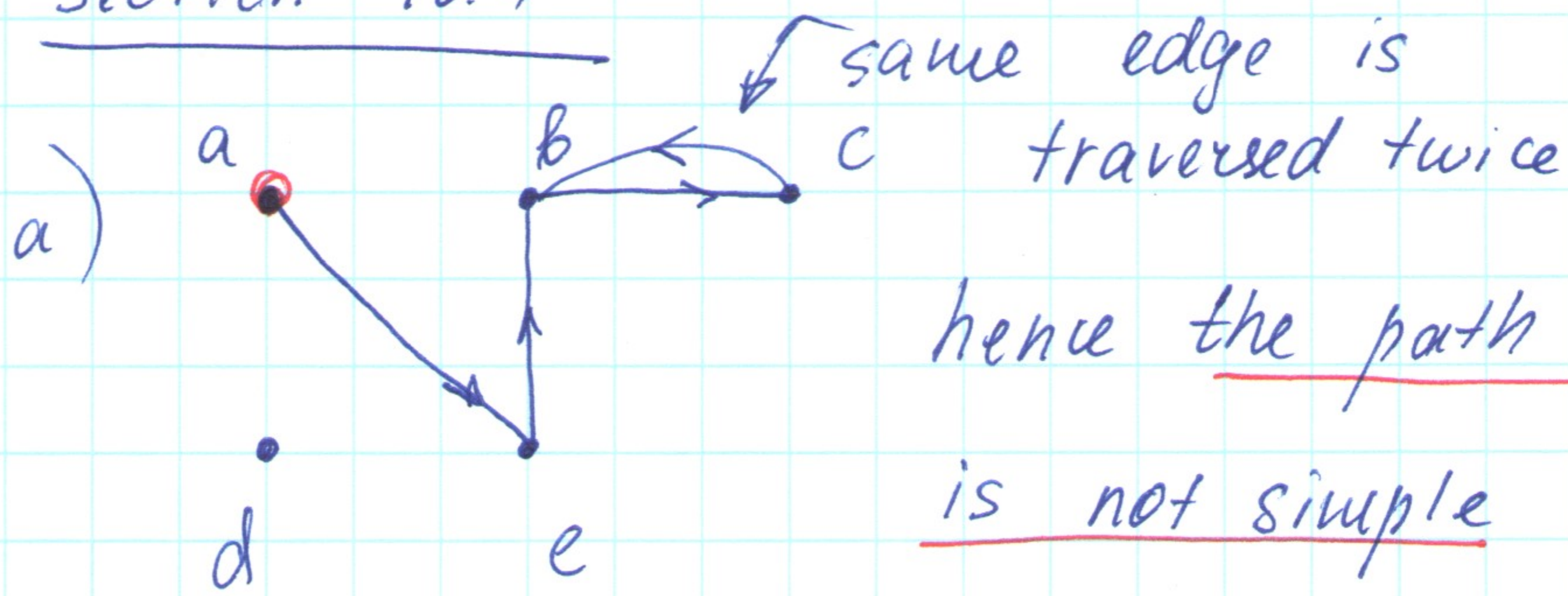


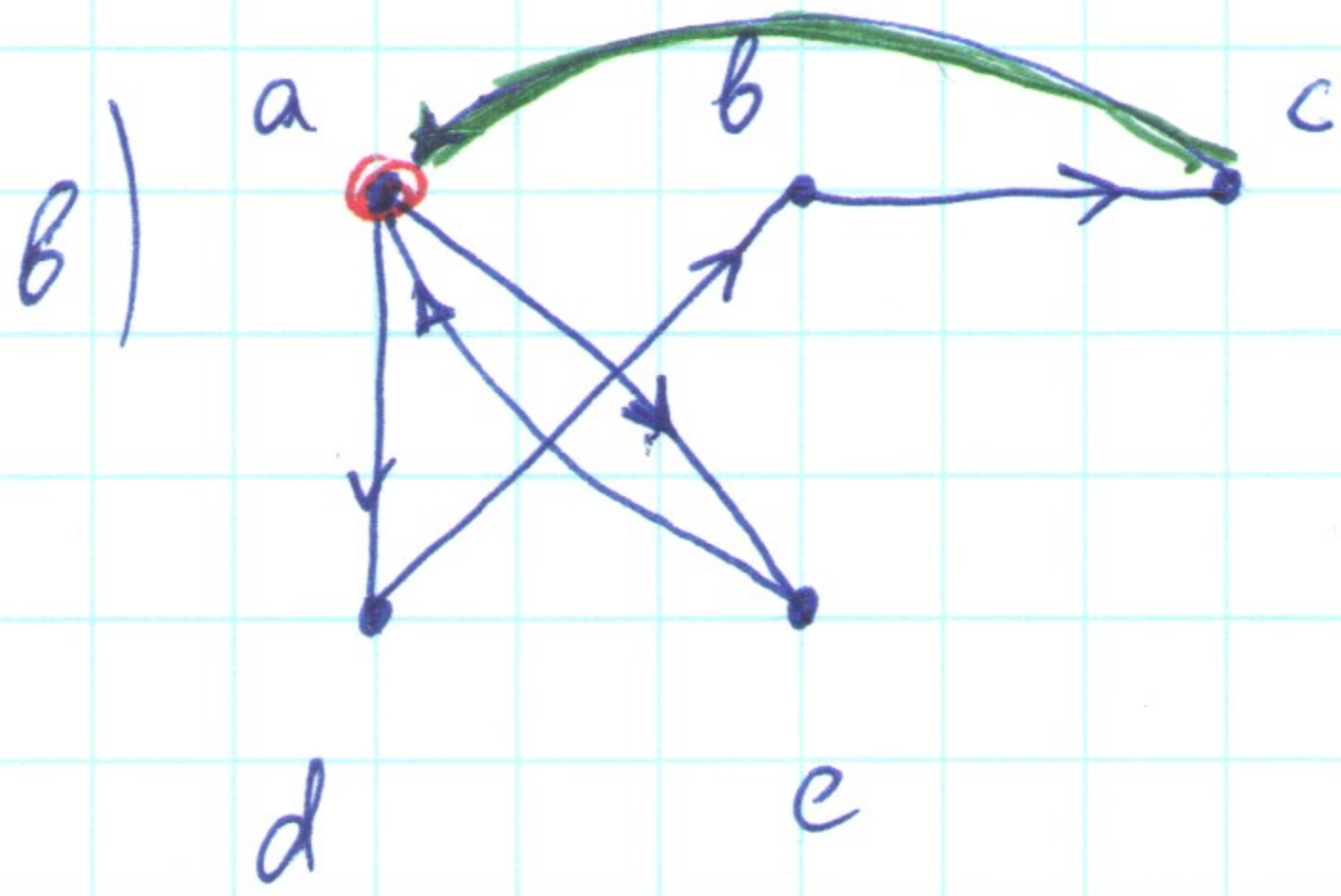
p. 689/1



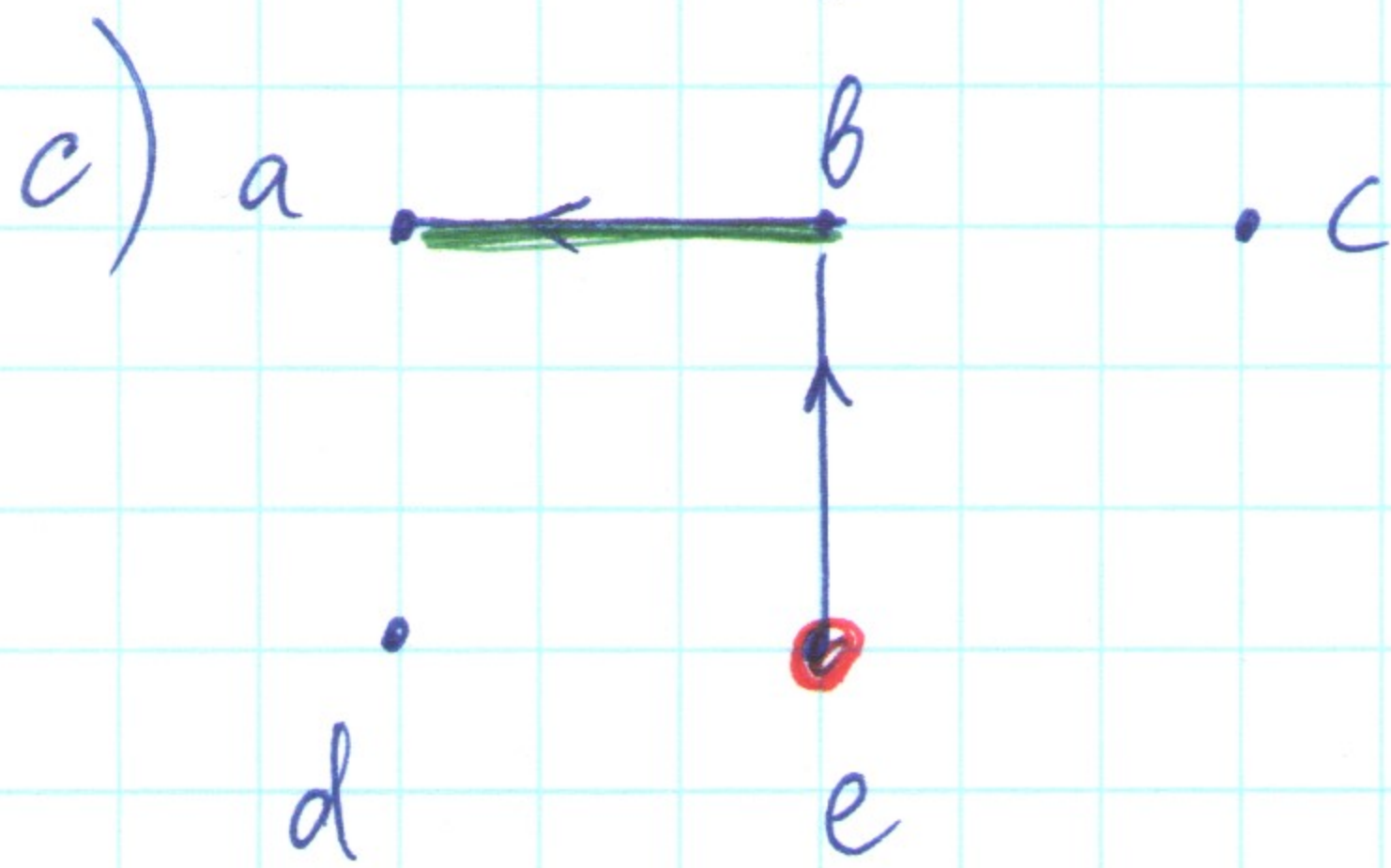
hence the path a, e, b, c, b
is not simple

• not a circuit

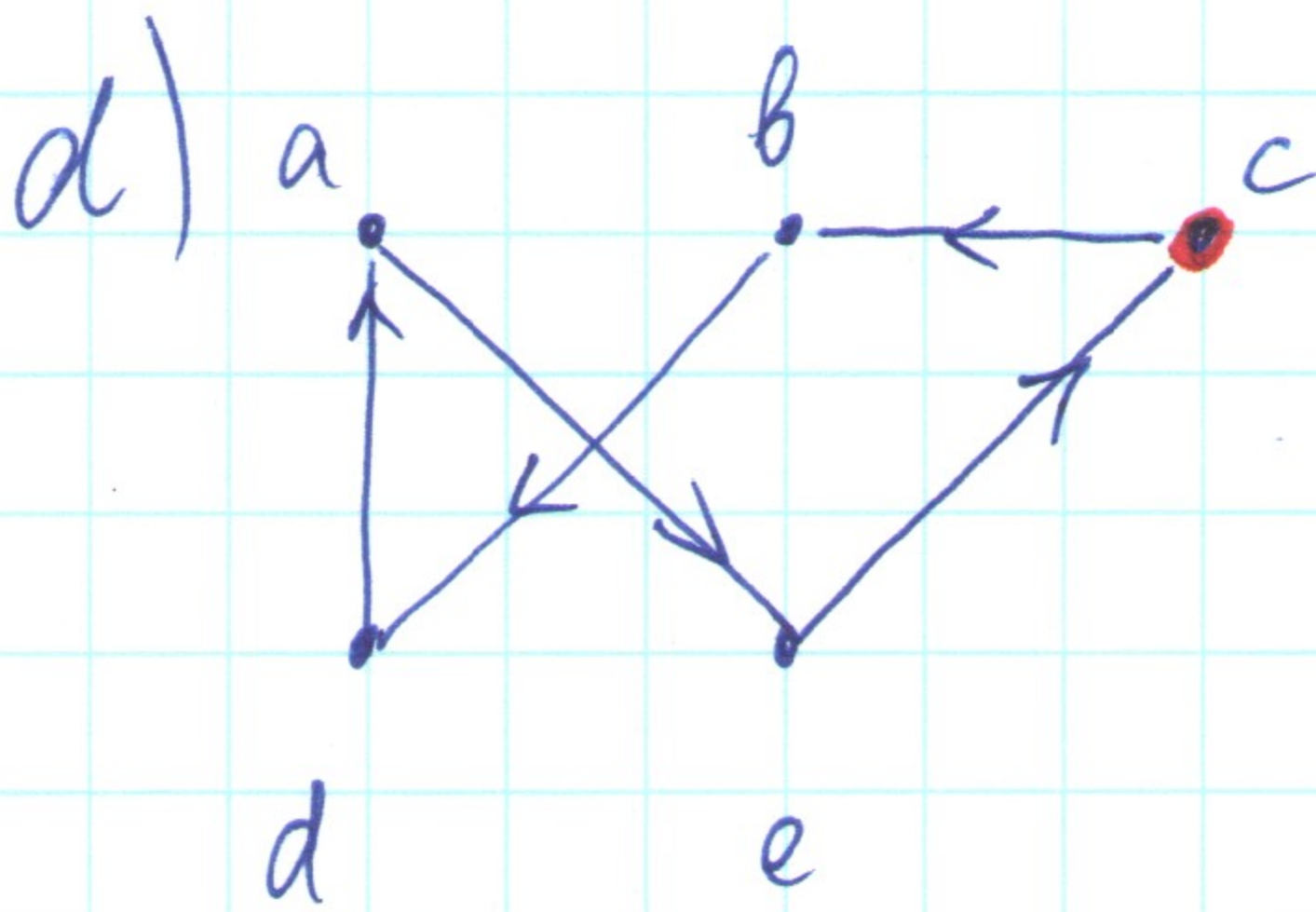
• length : 4



• not a path because the graph
doesn't have edge a c



• not a path because $\{b, a\} \notin E$



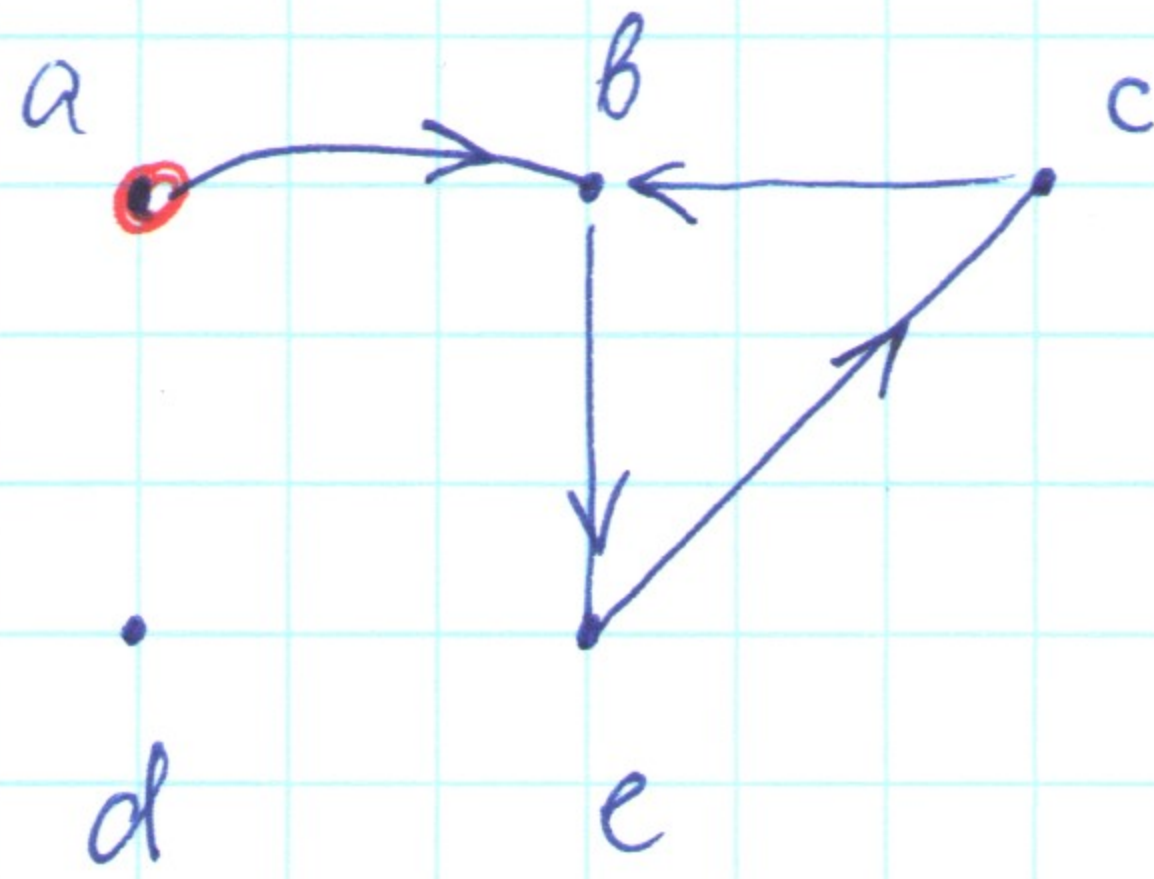
• it is a simple circuit

(we stop where we start,
each edge in the circuit is traversed
only once)

• length : 5

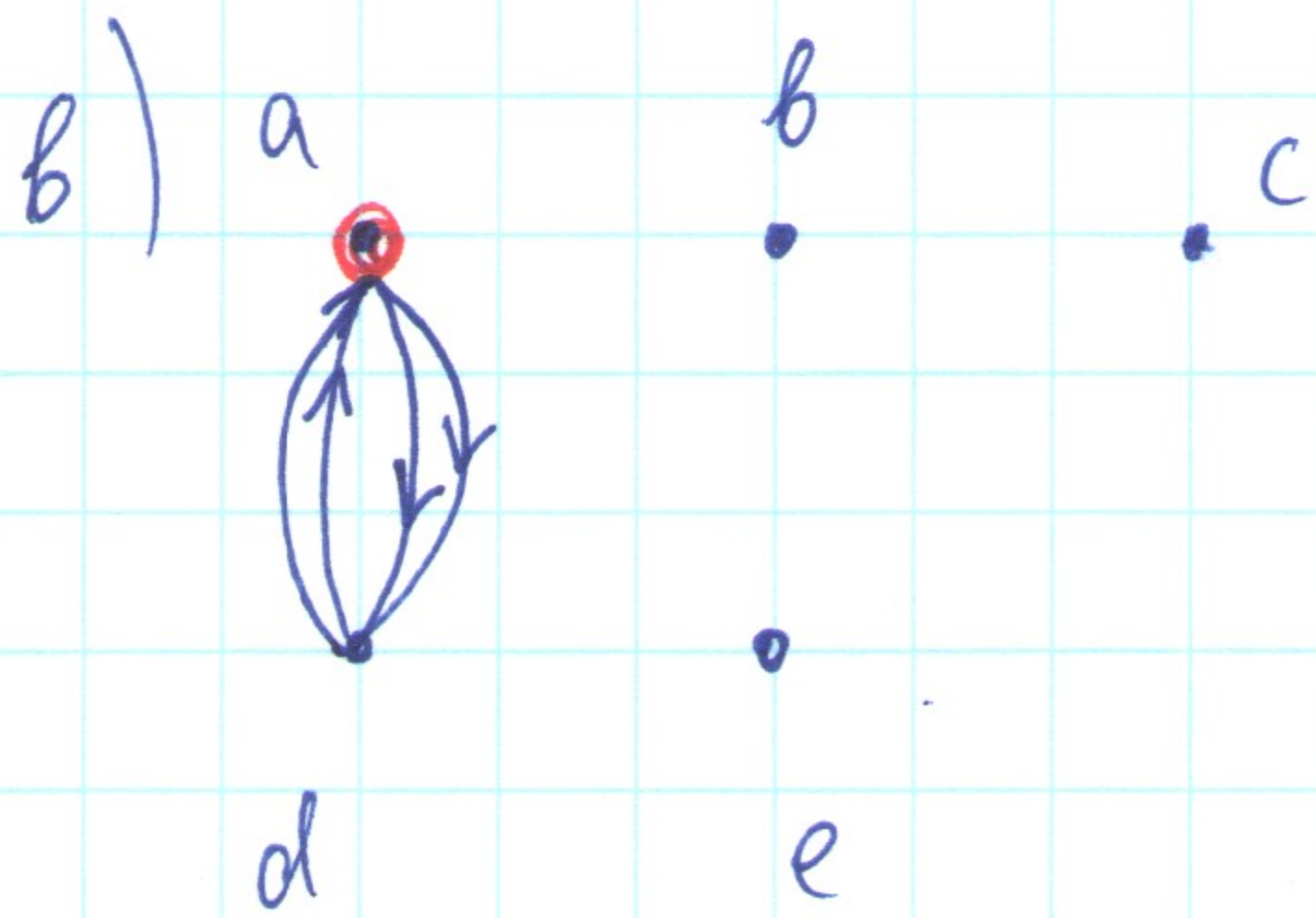
p. 689/2

a)



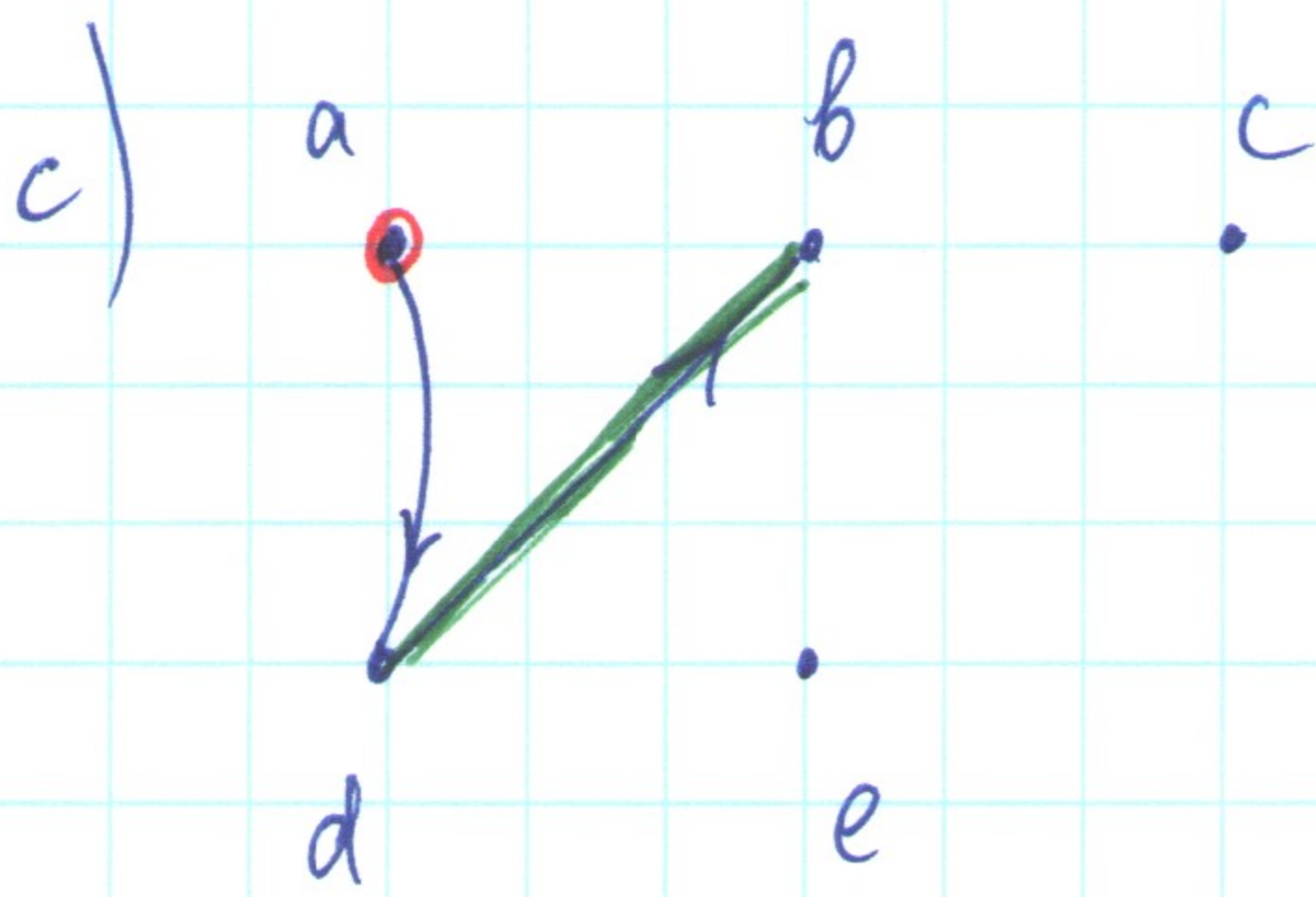
- it is a simple path
(no edge is traversed more than once, start at a, stop at b)

• length: 4

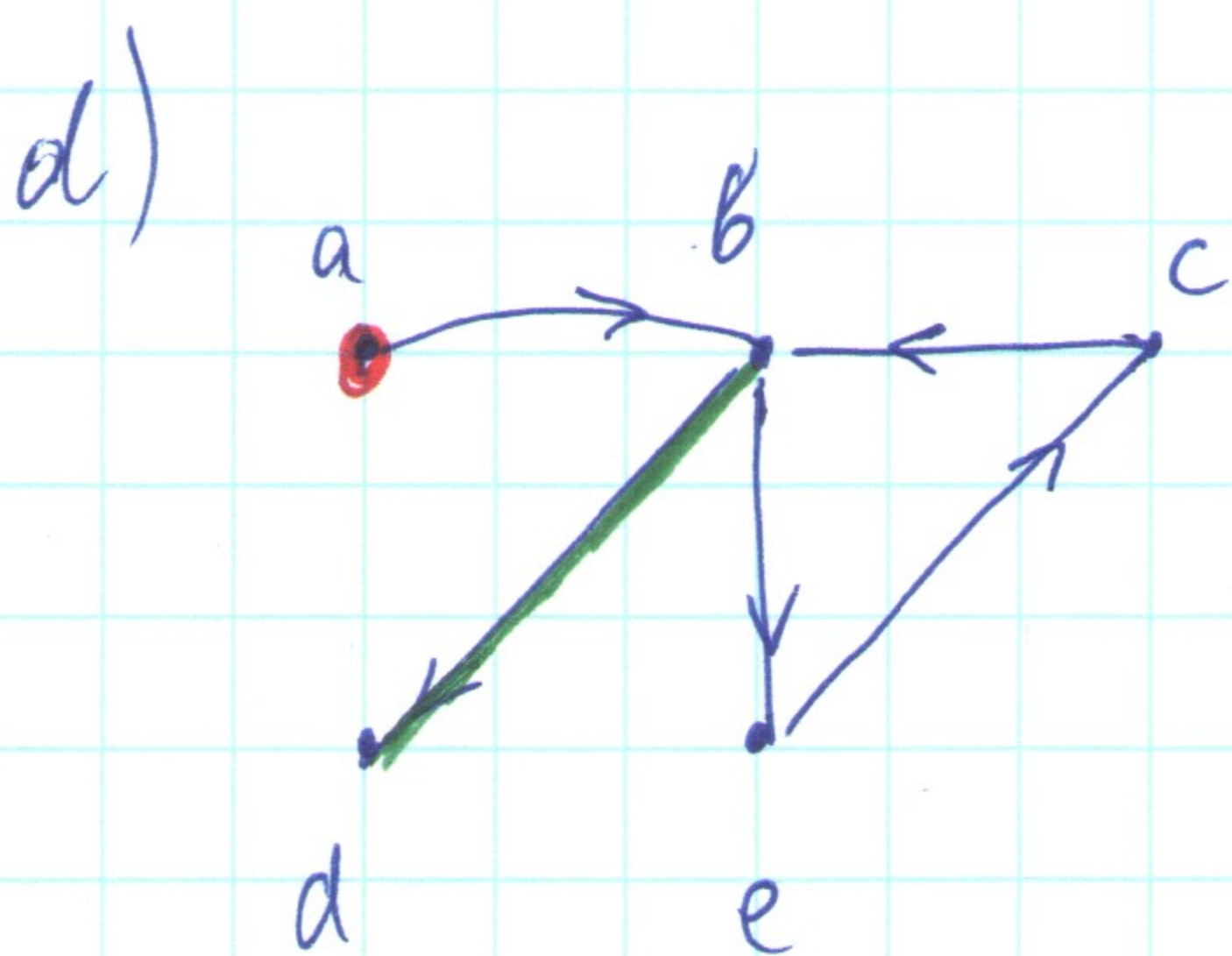


- it is a circuit (start and stop at a)
- not simple (edges (a,d) and (d,a) are traversed twice each)

• length: 4

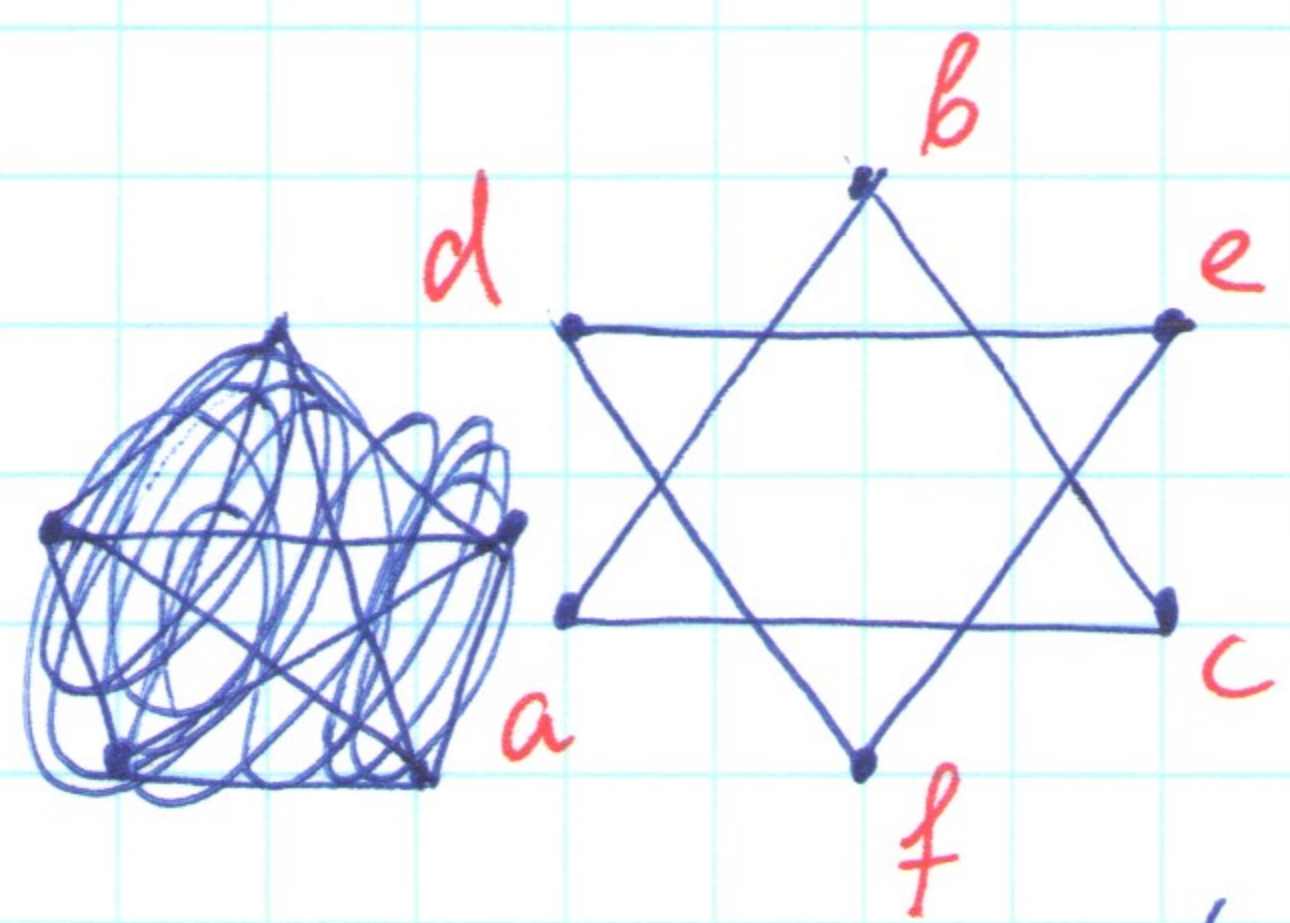


- not a path since edge (d,b) $\notin E$



- not a path ((b,d) $\notin E$)

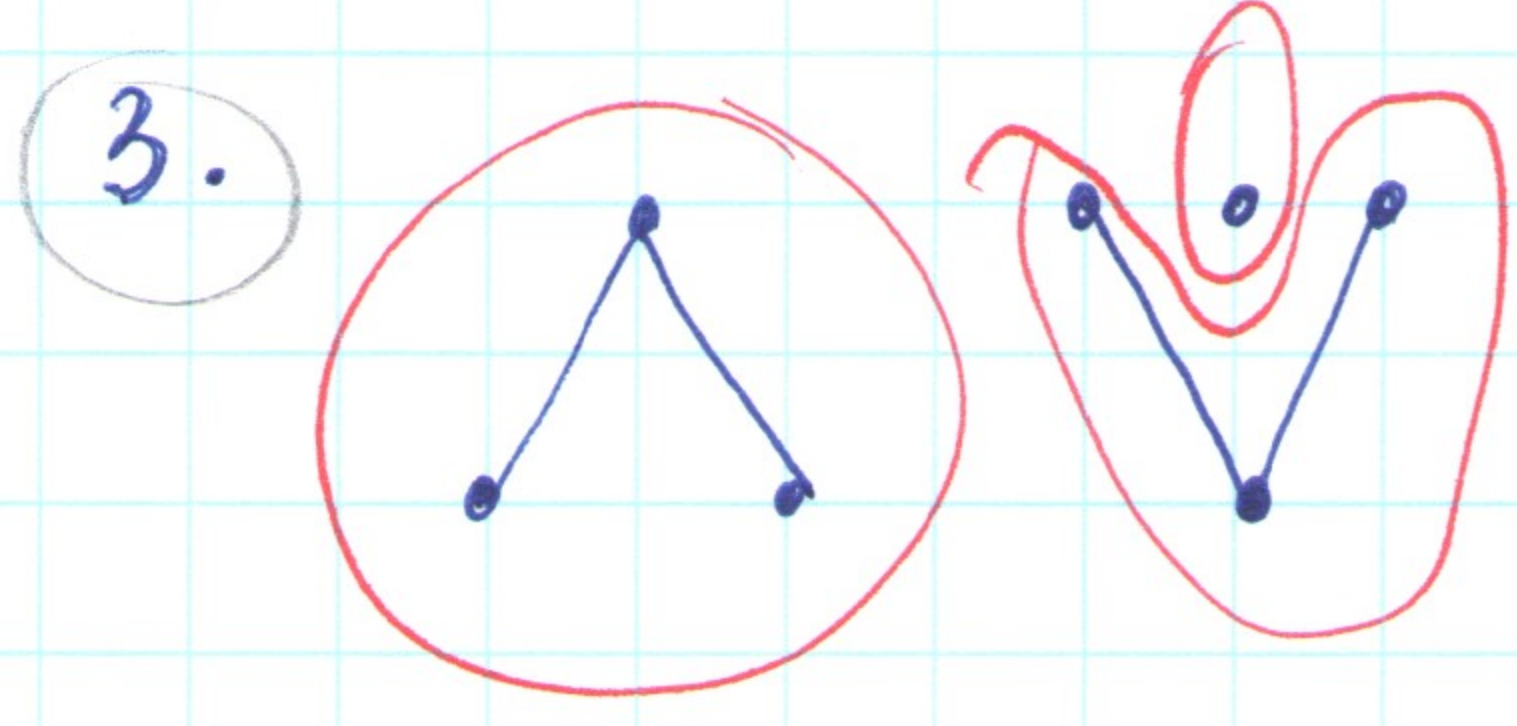
p. 689/5



the graph is not connected
(it has two connected component though)

- there is no paths from $\{a, b, c\}$ to $\{d, e, f\}$.

p. 689/6



3 connected components

4.



no connected components, the graph is connected

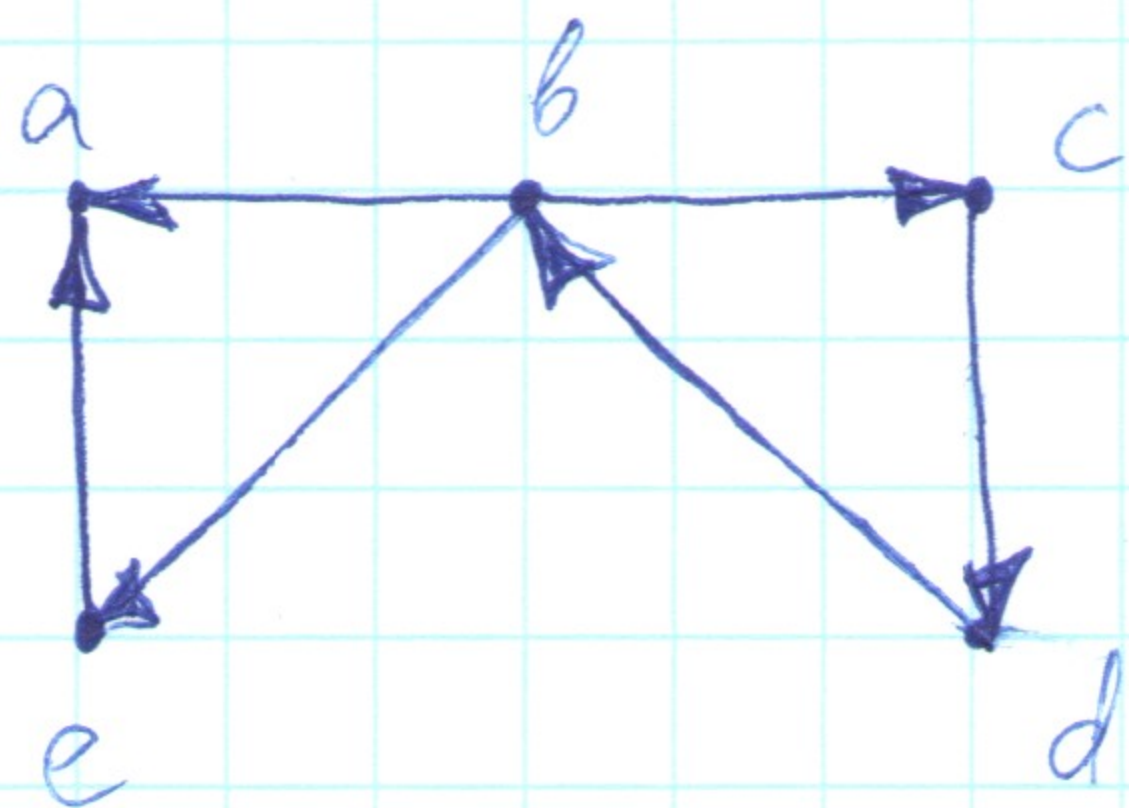
5.

see #5 above: two connected components $V_1 = \{a, b, c\}$,
 $V_2 = \{d, e, f\}$

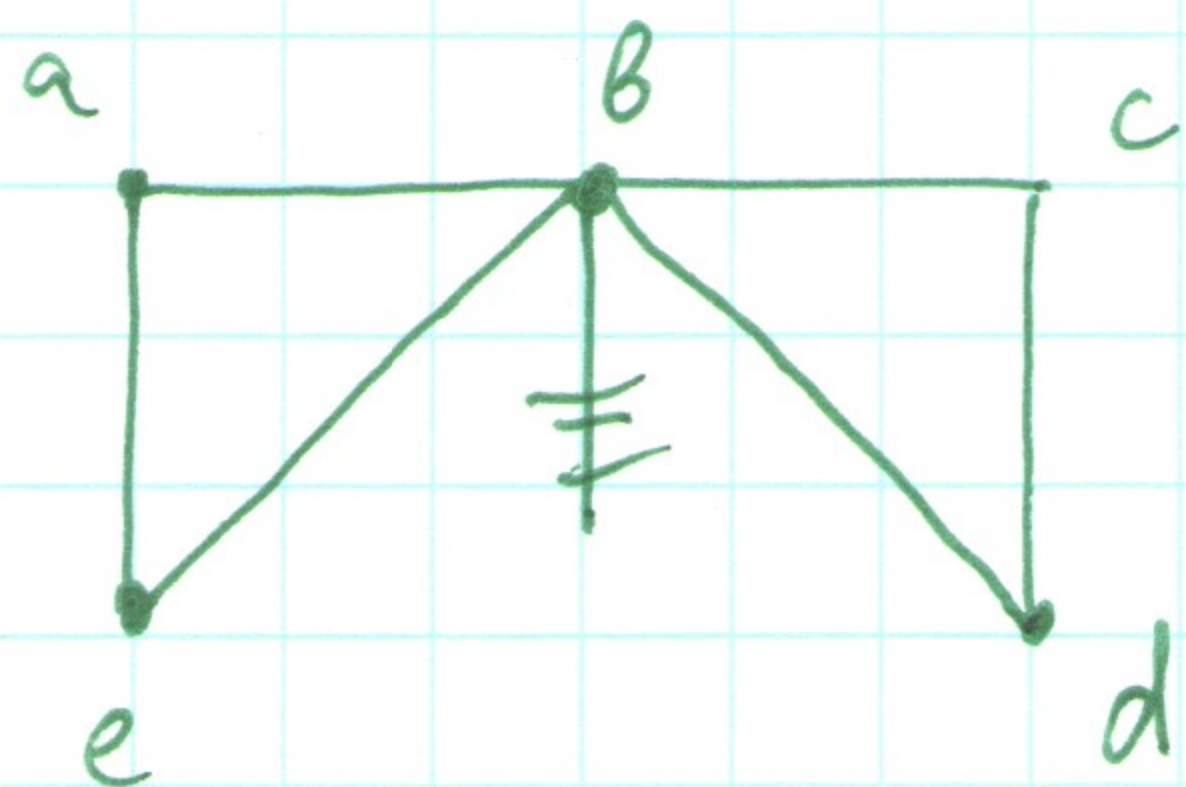
p. 689/4

the graph is connected

p. 689/11 a)

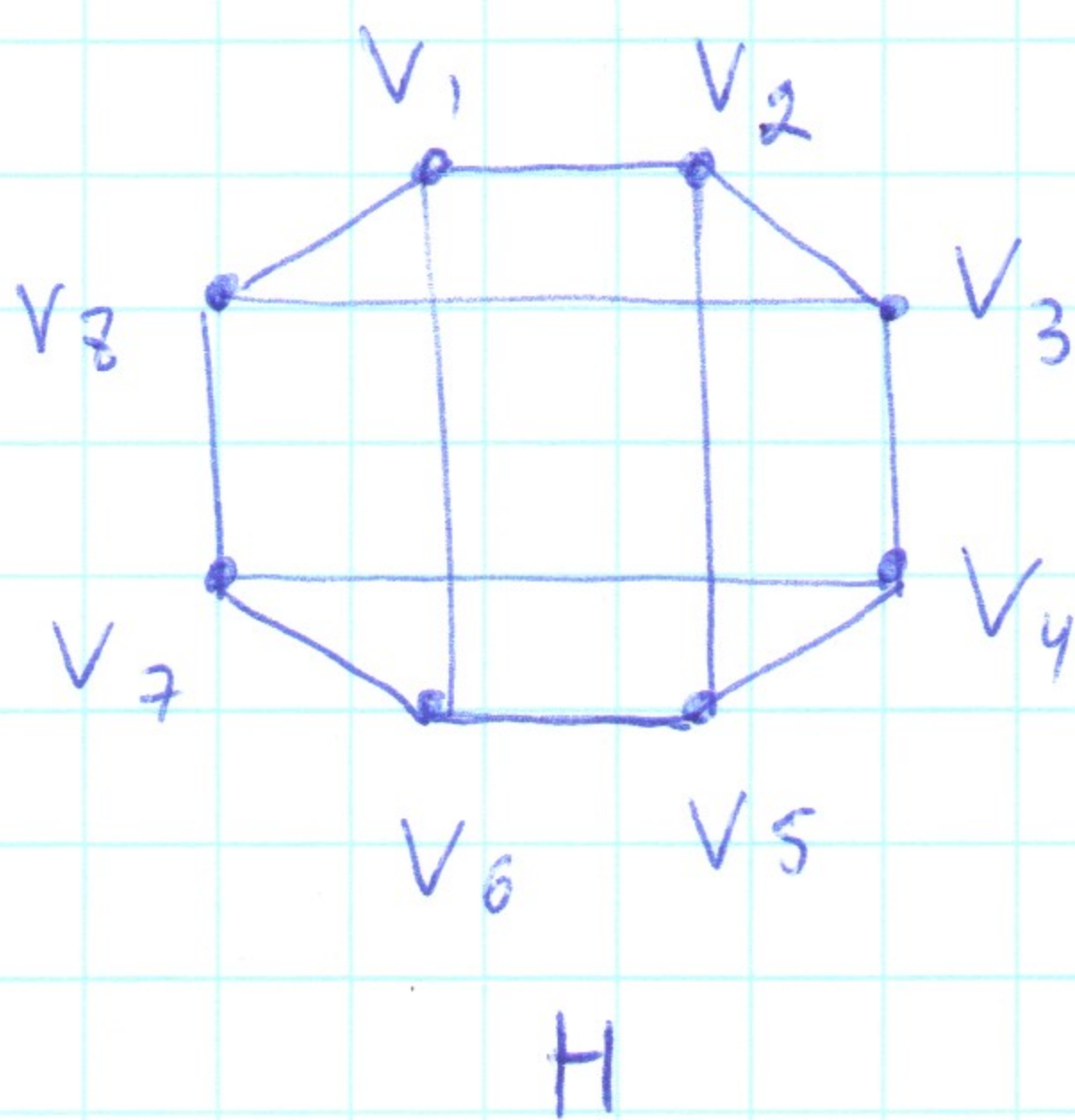
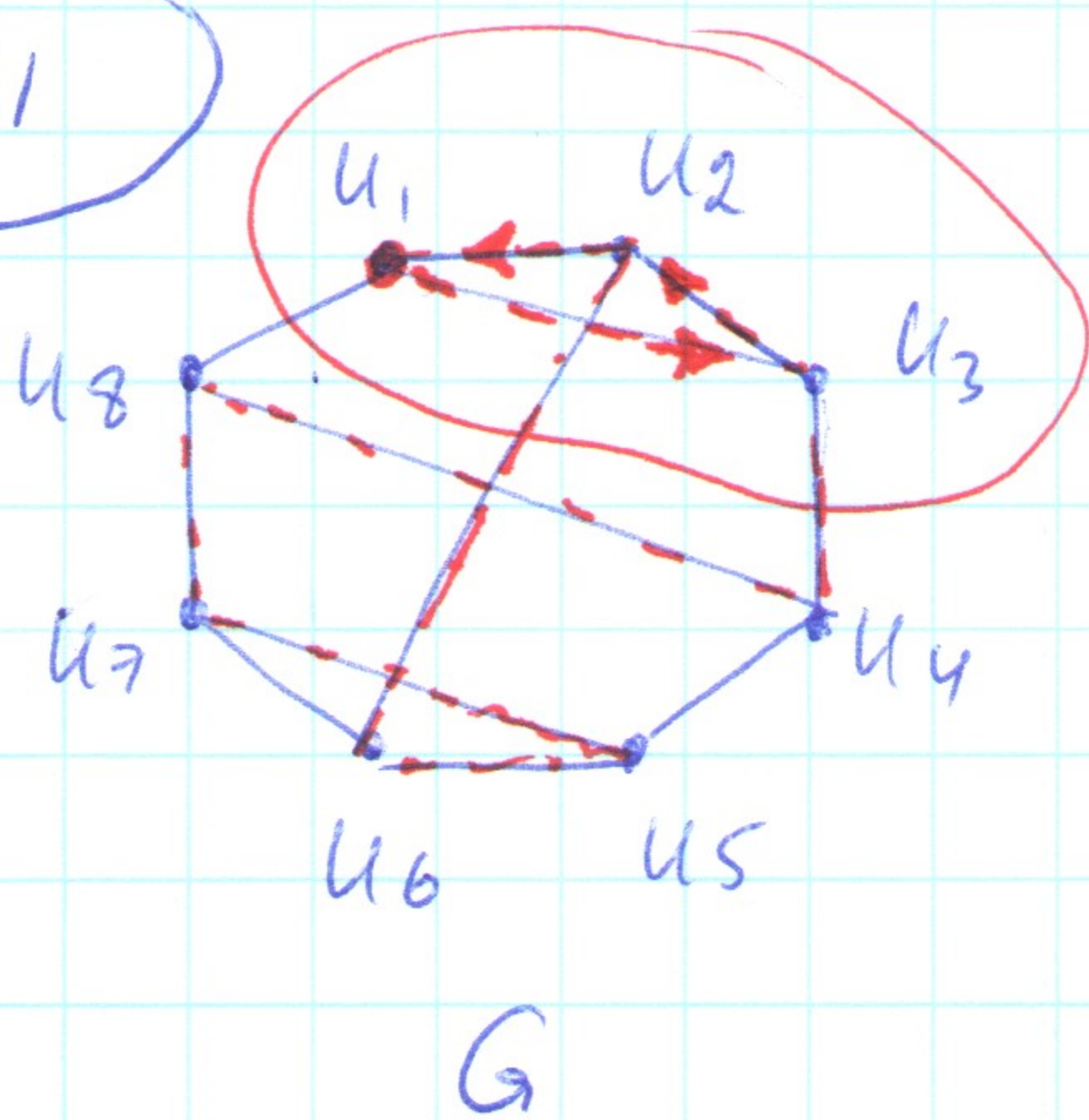


the graph is not strongly connected because there is no path from a to b (or from a to any other vertex in the graph)



the underlying undirected graph is connected, therefore the original graph is weakly connected.

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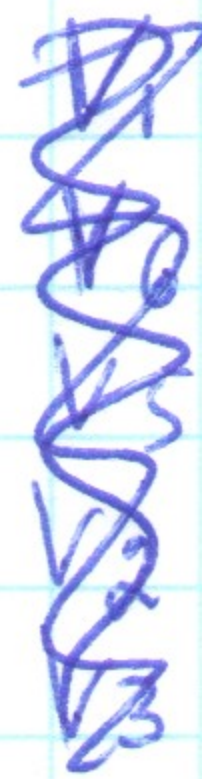


path in G:
(simple circuit)

- u₁
- u₃
- u₂
- u₁
- ~~u₄~~
- ~~u₅~~
- ~~u₆~~
- ~~u₇~~
- ~~u₈~~

a simple circuit of length 3

path in H:
(simple circuit)

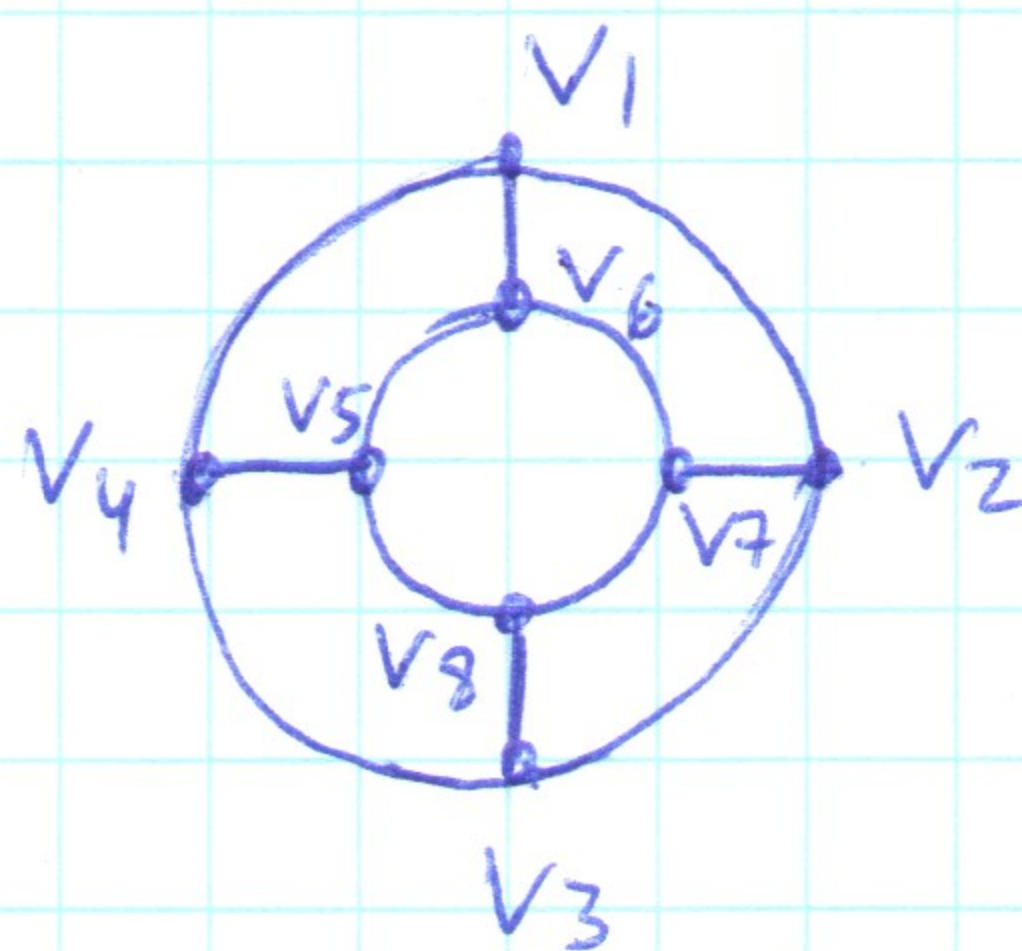
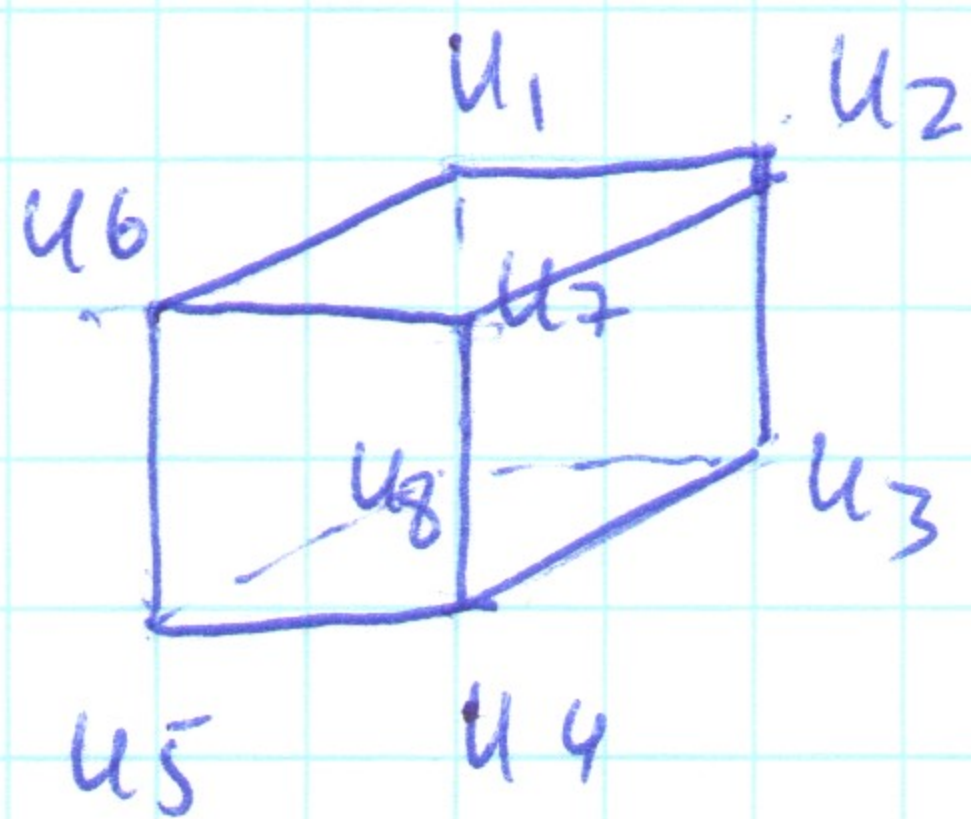


no simple circuit of length 3

Therefore graphs

G and H are not isomorphic

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G

H

Let's follow a simple path in G (and "mirror" it in H) to visit all vertices:

a path in G: $u_1, u_2, u_3, u_8, u_5, u_6, u_7, u_4$

a path in H: $v_1, v_2, v_3, v_4, v_5, v_6, v_7, v_8$

	u_1	u_2	u_3	u_8	u_5	u_6	u_7	u_4
u_1	0	1	0	1	0	1	0	0
u_2	1	0	1	0	0	0	1	0
u_3	0	1	0	1	0	0	0	1
u_8	1	0	1	0	1	0	0	0
u_5	0	0	0	1	0	1	0	1
u_6	1	0	0	0	1	0	1	0
u_7	0	1	0	0	0	1	0	1
u_4	0	0	1	0	1	0	1	0

	v_1	v_2	v_3	v_4	v_5	v_6	v_7	v_8
v_1	0	1	0	1	0	1	0	0
v_2	1	0	1	0	0	0	1	0
v_3	0	1	0	1	0	0	0	1
v_4	1	0	1	0	1	0	0	0
v_5	0	0	0	1	0	1	0	1
v_6	1	0	0	0	1	0	1	0
v_7	0	1	0	0	0	1	0	1
v_8	0	0	1	0	1	0	1	0

The matrices are equal, hence G and H are isomorphic.