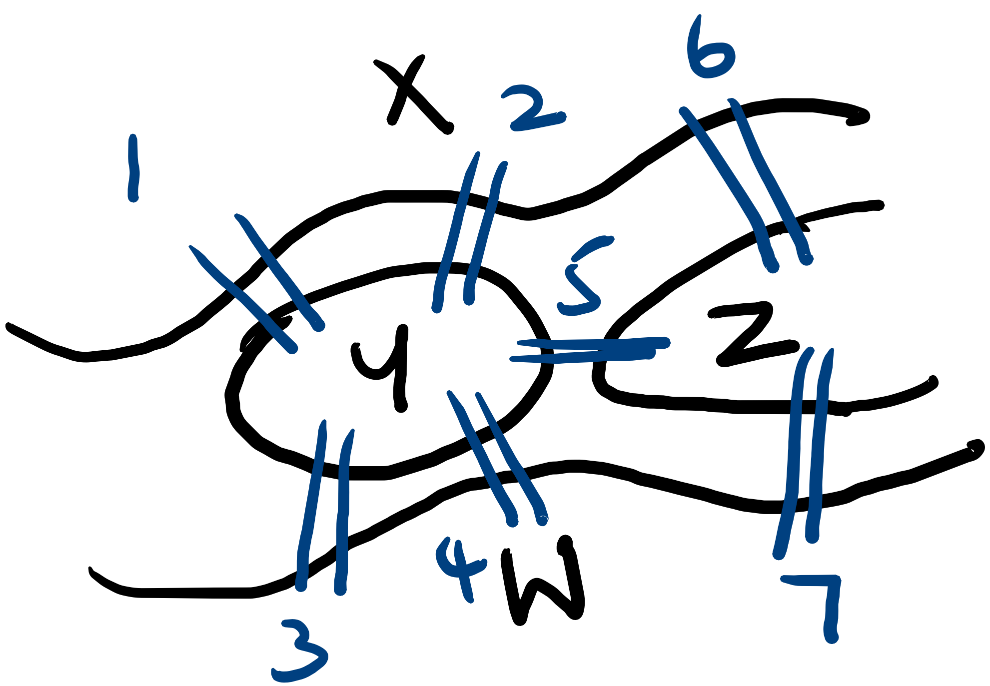
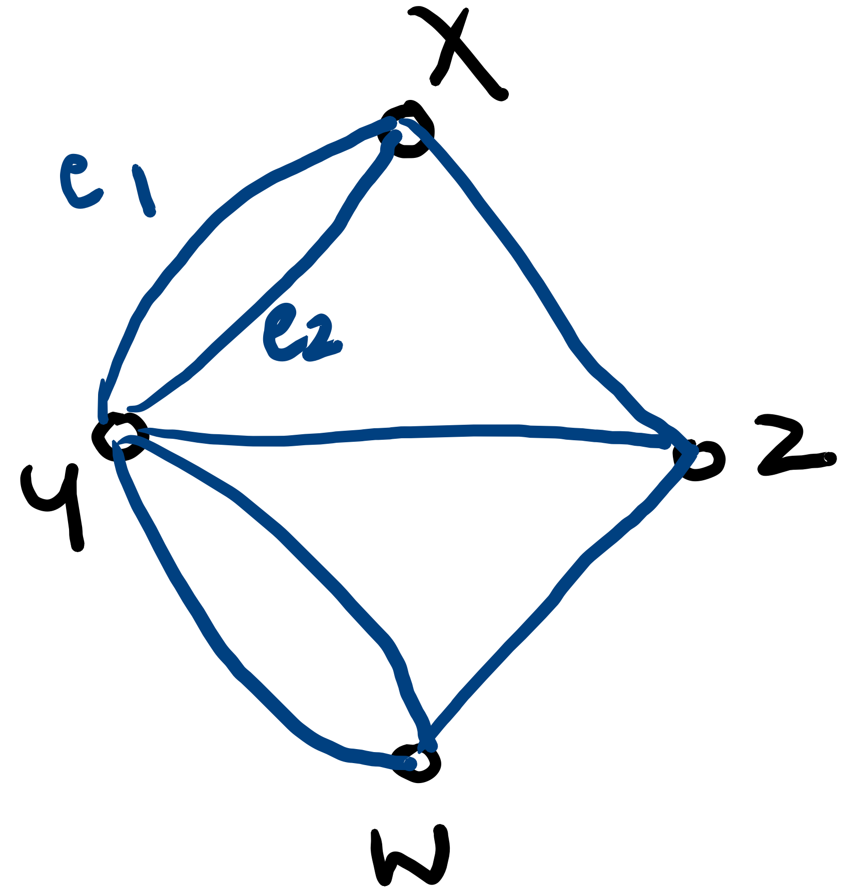
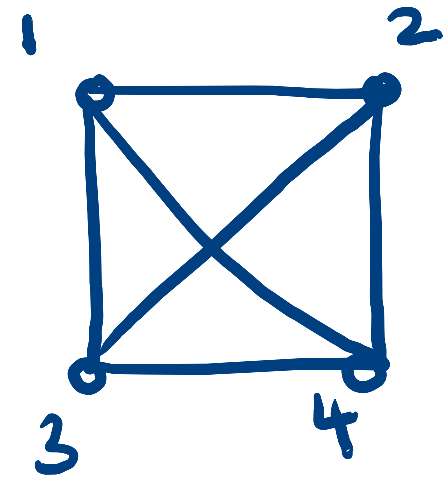
Graph Theory : Origin

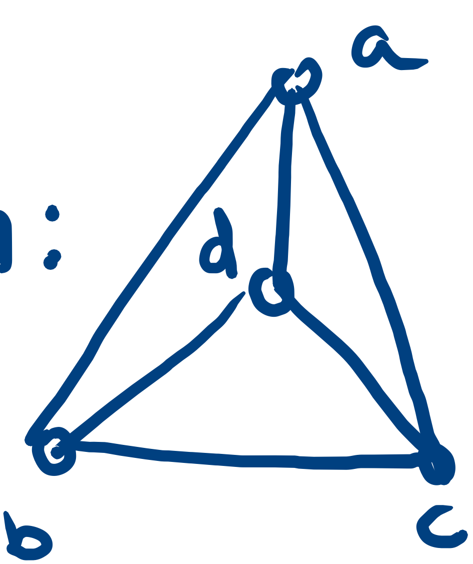




Leave from one vertex & come back to the same vertex visiting each edge <u>exactly</u> <u>once</u>?

Drawing does not matter:

G: 

H: 

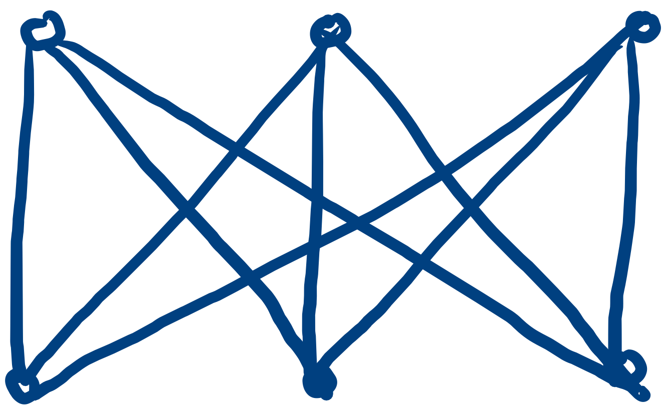
$G \cong H$.

$$f : \{1, 2, 3, 4\} \longrightarrow \{a, b, c, d\}$$

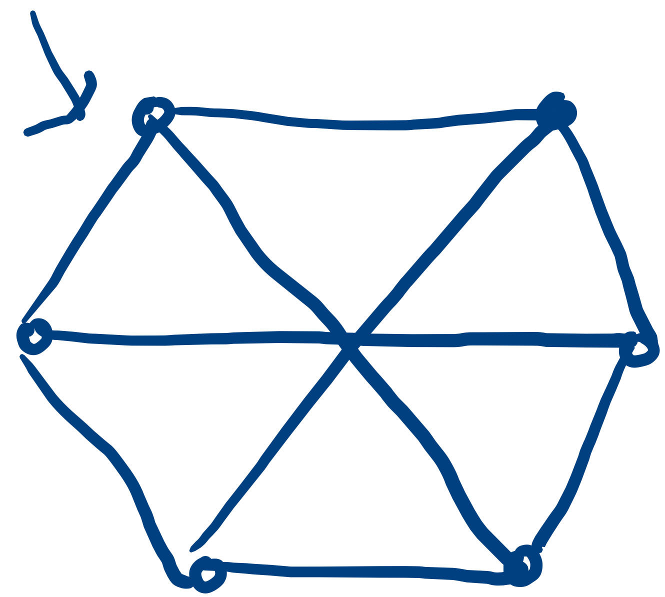
$f(1) = a$ $\quad$ $f(3) = c$

$f(2) = d$ $\quad$ $f(4) = b$

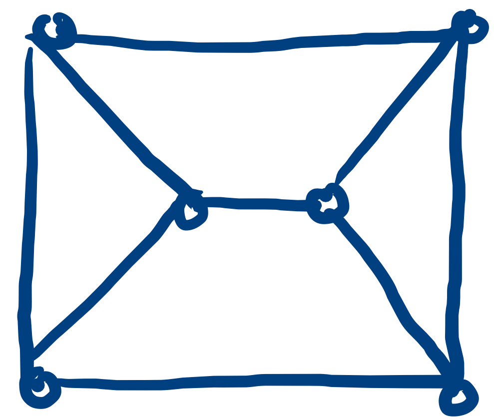
Four graphs are given. Check for isomorphism.



$K_{3,3}$

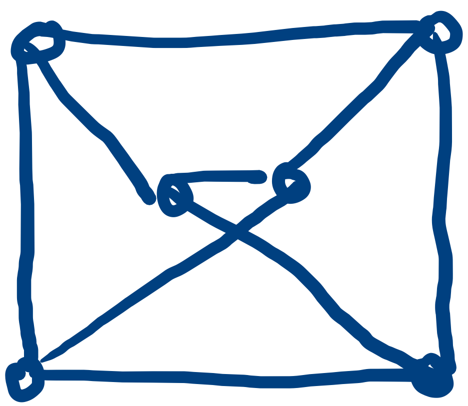


G

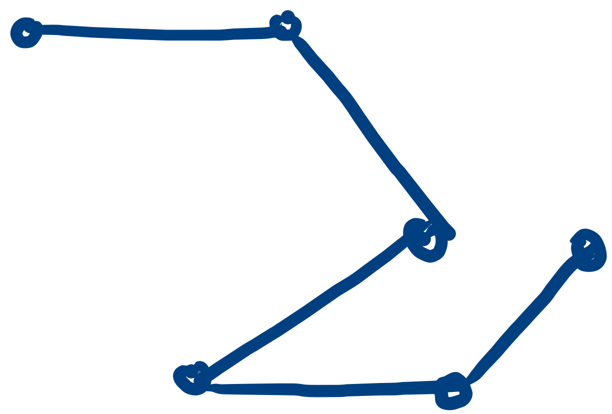


H

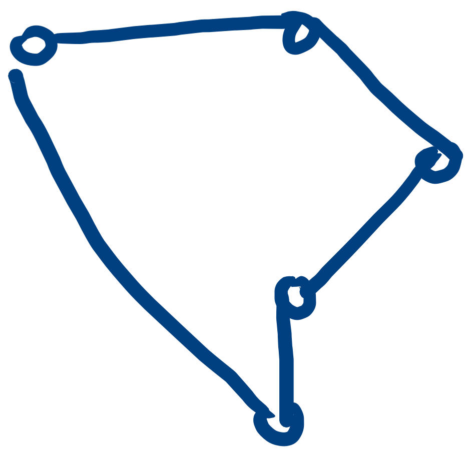
H' :



Path:

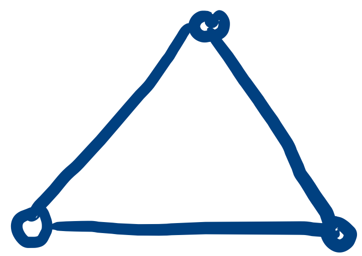
P_6:  $\cong$ 

Cycle:

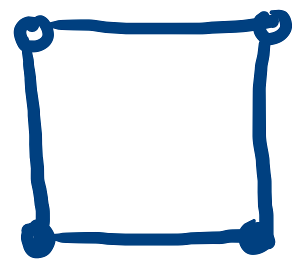
C_5: 

Complete graphs:

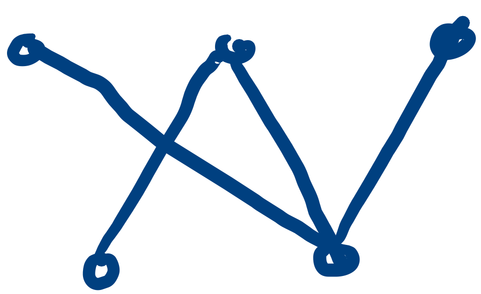
C_2



C_3

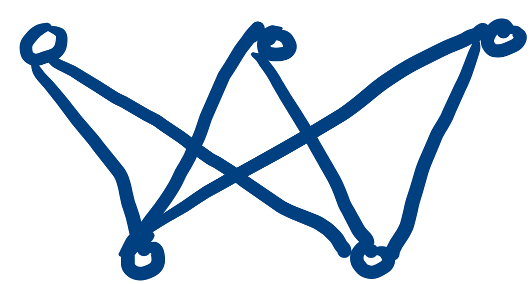


Bi-partite graph:



(not complete)

Complete bipartite graph:



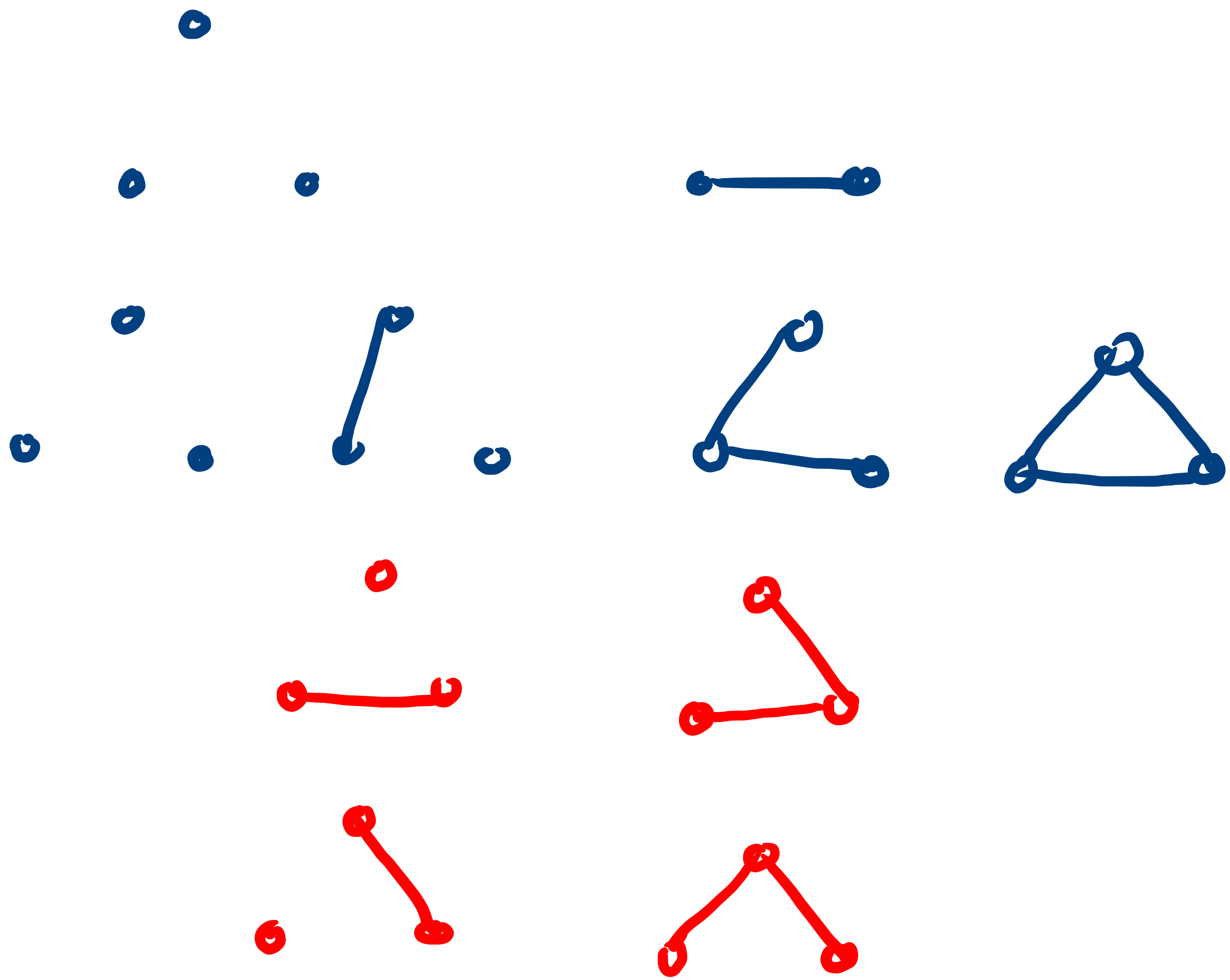
$K_{3,2}$

Counting graphs (simple) over n vertices: $2^{\binom{n}{2}}$

$n=1$

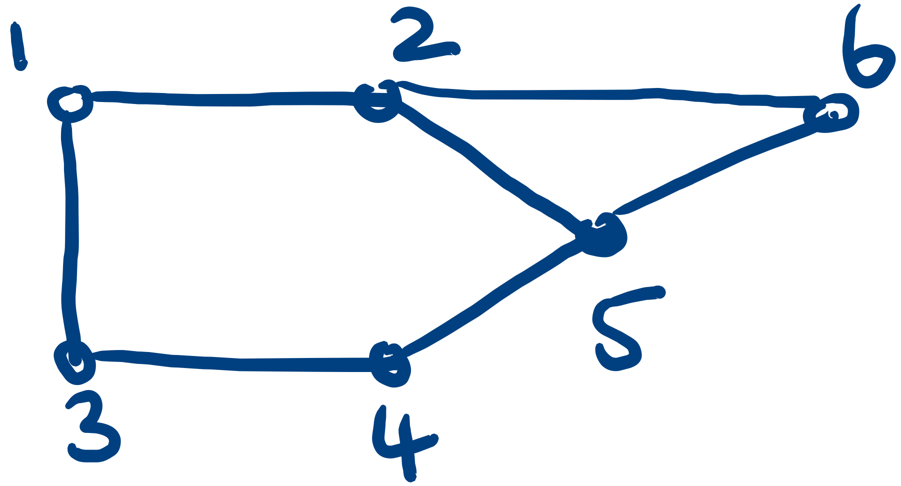
$n=2$

$n=3$

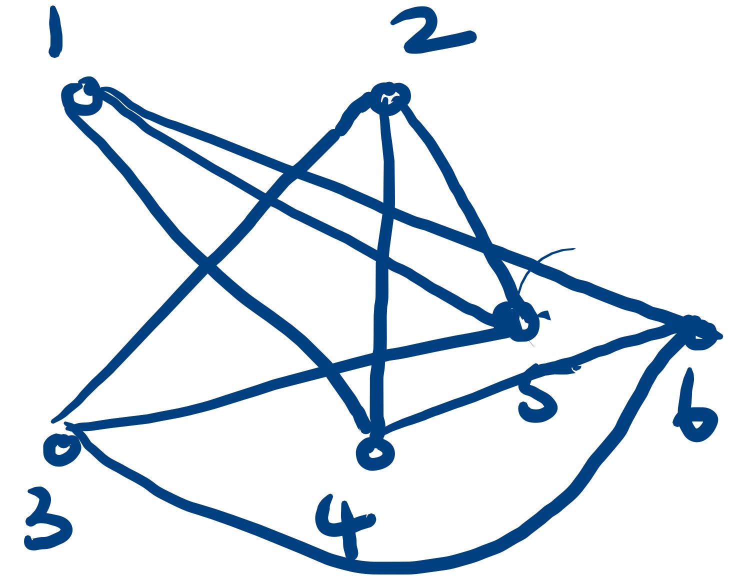


Complement of a graph:

G :

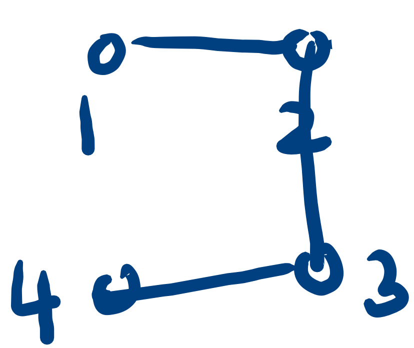


$\bar{G}$:
or
G^c

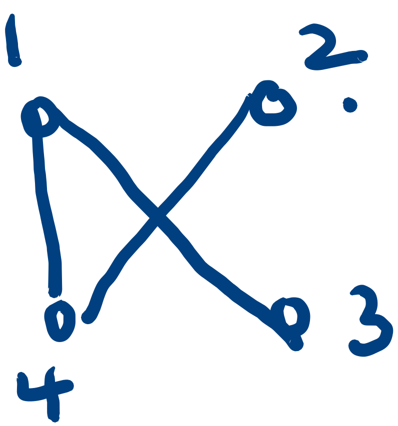


P_4 & C_5 are self-complementary, they are isomorphic to $\bar{P_4}$ & $\bar{C_5}$ respectively.

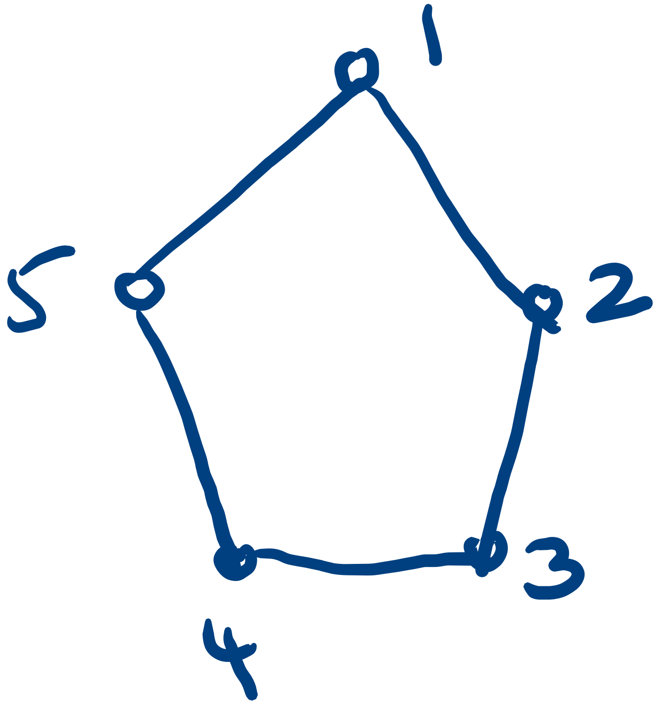
P_4 :



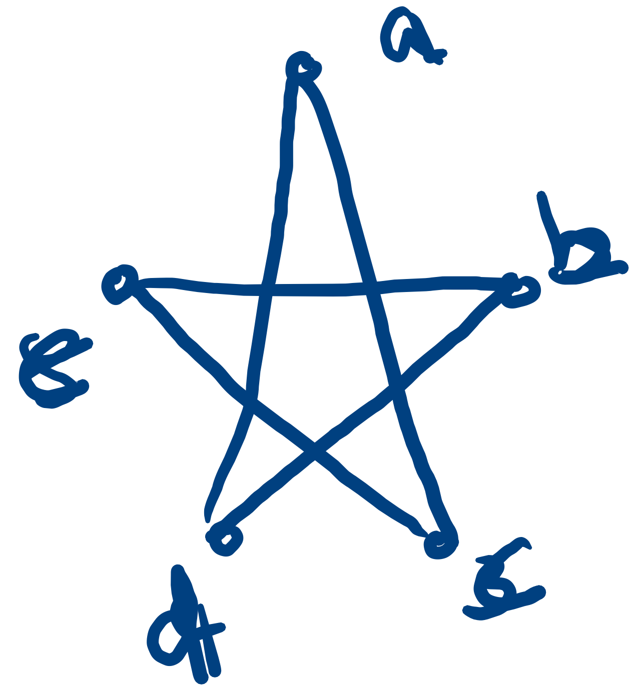
$\bar{P}_4$:



C_5 :



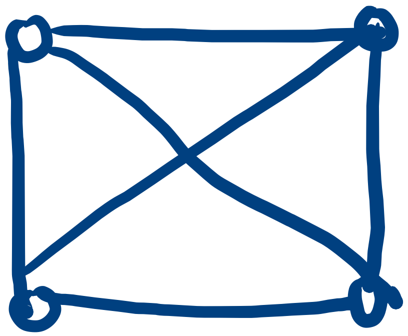
$\overline{C_5}$:

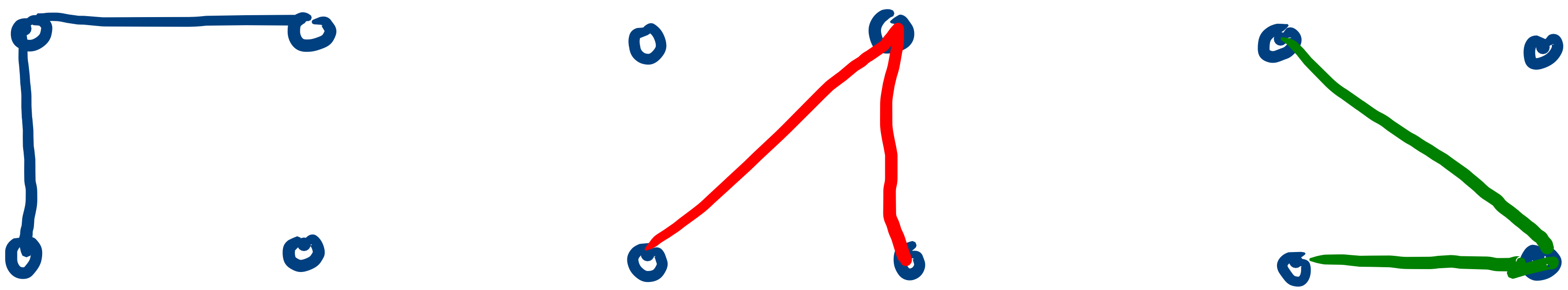


$$C_5 \cong \overline{C_5}$$

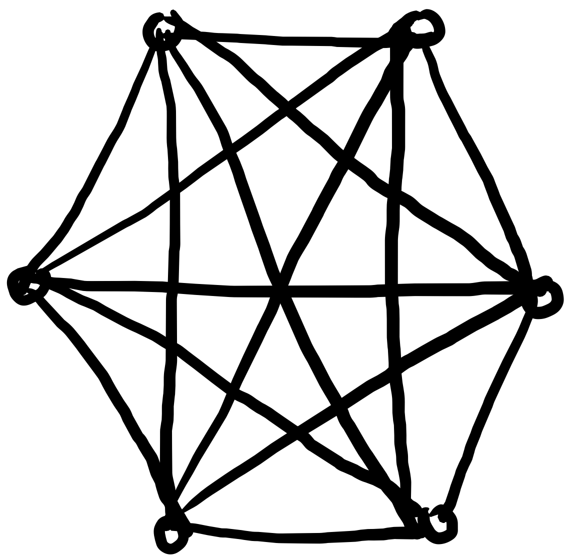
Graph decomposition:

K_4:





K_6 :



K_6 can be decomposed into five copies of P_4.