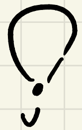
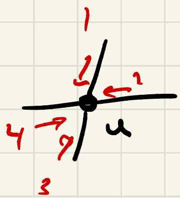
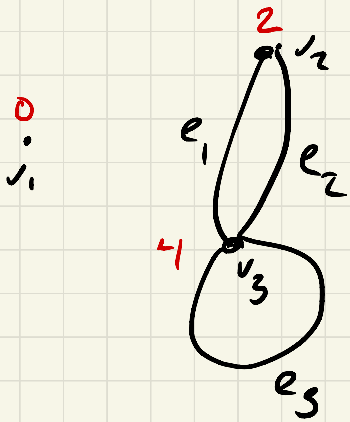
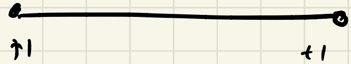


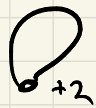
$\deg(v) = 2$



$\deg(u) = 4$







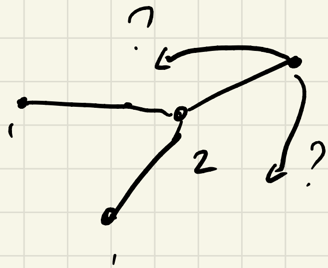
Every edge adds 2 to the total degree of the graph

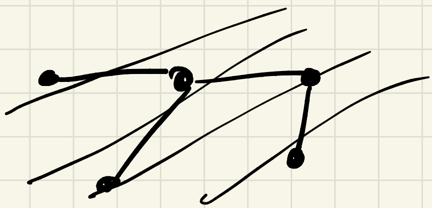
$$2 \cdot \underline{N(E)}$$

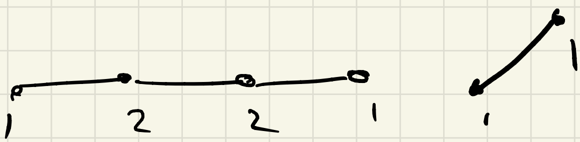
Total degree of the Graph is even!

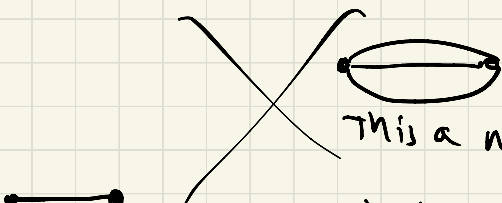
$1+1+2+3 = 7$

A total degree must be <u>even</u>

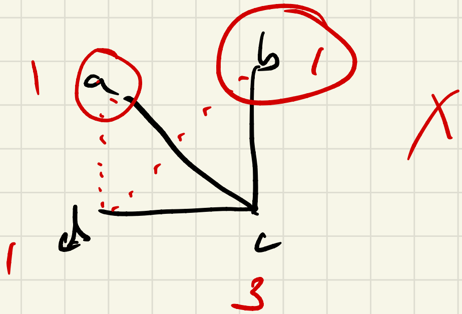








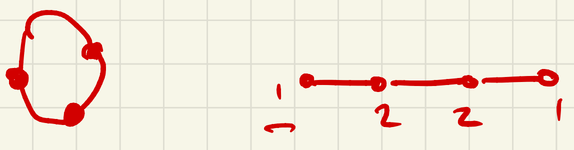
This is not a simple graph
b/c it has two parallel
edges



G has even number of

even degree nodes ≥ 0

odd degree nodes ≥ 0



$$T = O + E$$

total degree — sum odd degree — sum even degree nodes

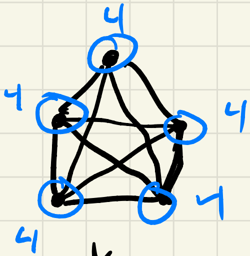
E - Must be even

T - is also even!

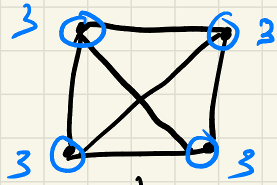
$O = T - E \Rightarrow O$ must be even!

even number of odd degree nodes!

~~3+3 3+3+3 3+3 2+3~~

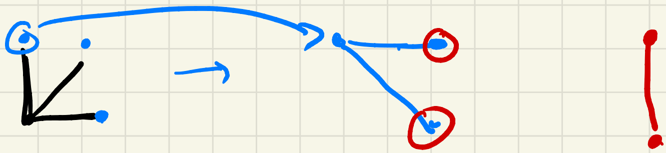


K_5



K_4

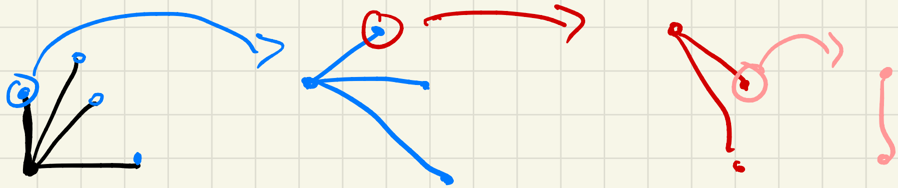
K_4



3 + 2 + 1

K_5

K_5



4 + 3 + 2 + 1

$$K_n = \sum_{i=1}^{n-1} i$$ Arithmetic Sum!

$$\sum_{i=1}^{n-1} i = \left(\sum_{i=1}^{n} i\right) - n$$

adds on extra n

subtract it out

$$= \frac{n(n+1)}{2} - n$$

$$= \frac{n^2+n}{2} - \frac{2n}{2}$$

$$= \frac{n^2-n}{2}$$

$$= \frac{n(n-1)}{2} \quad \checkmark$$

$9 \cdot 5 = 45$

that is not odd

the graph does not exist!