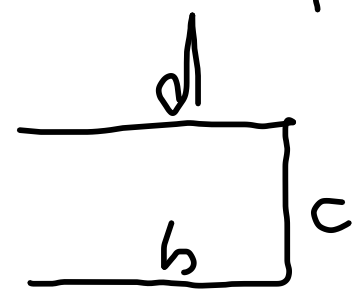
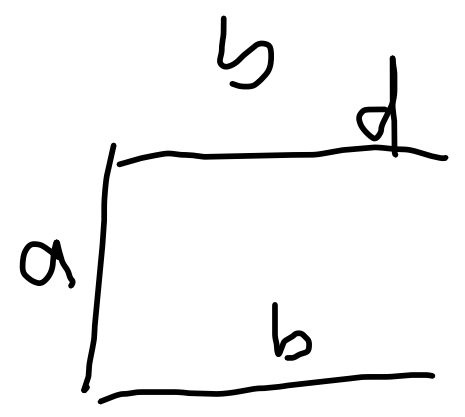
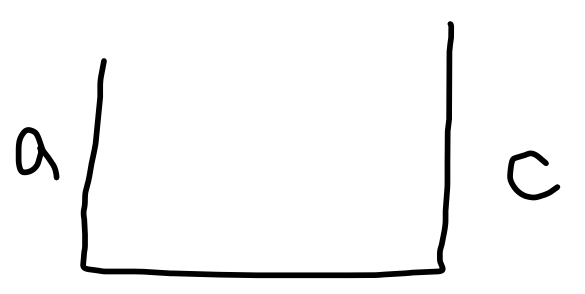
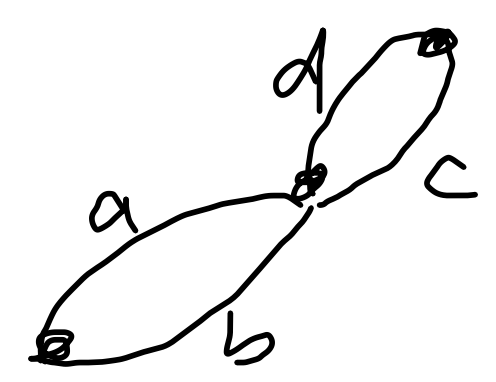
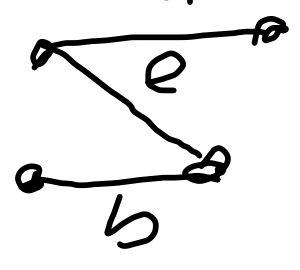
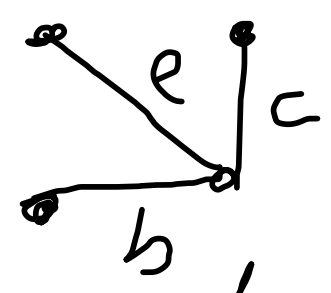
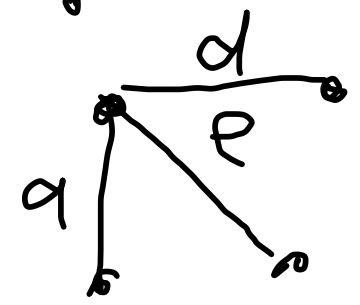
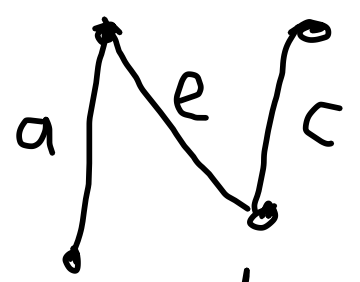


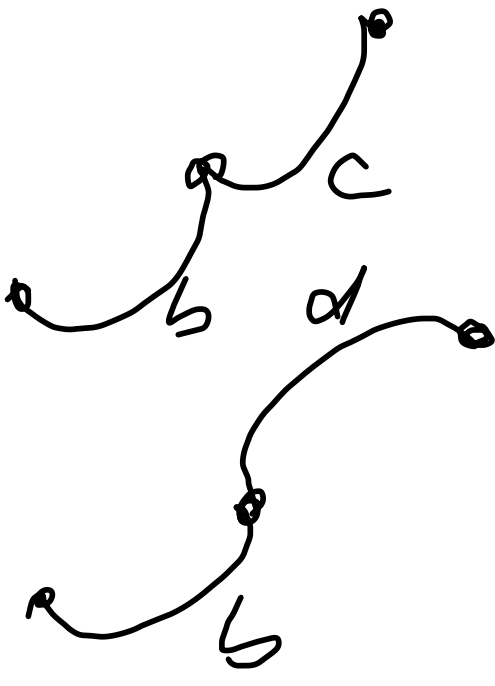
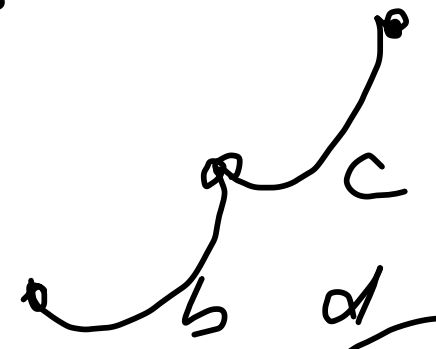
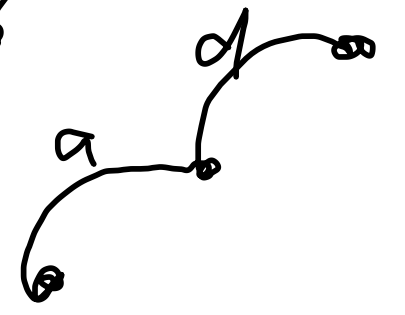
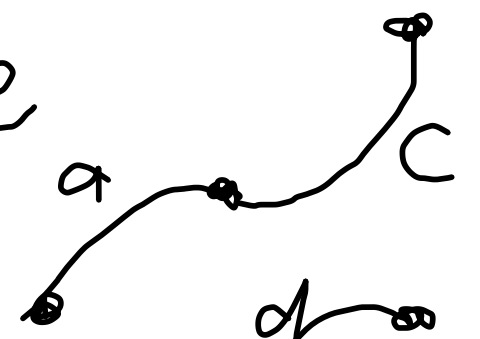
$G-e$

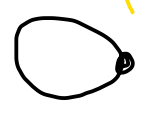
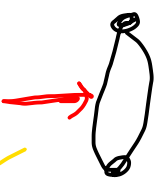
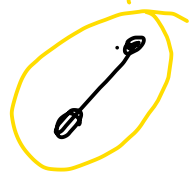
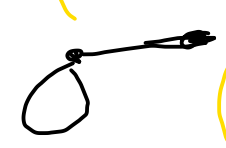
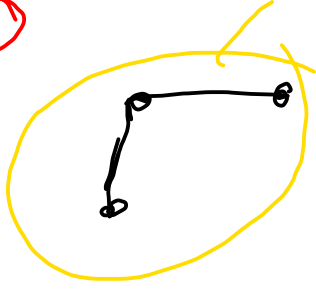
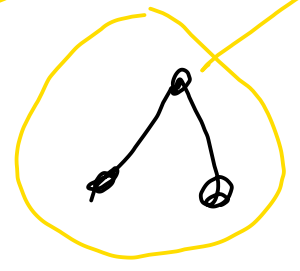
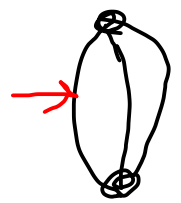
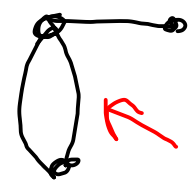
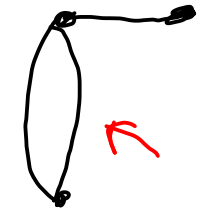
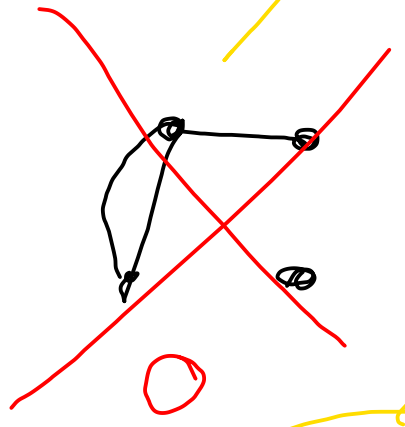
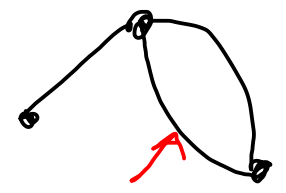
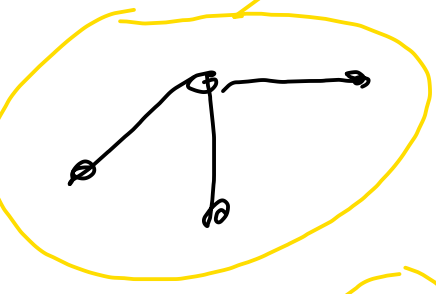
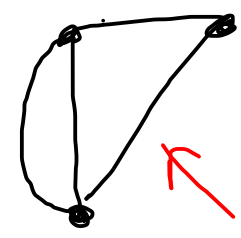
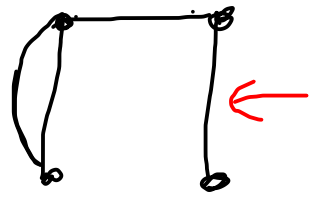
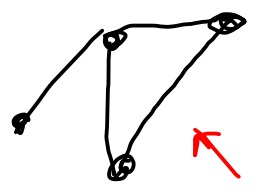
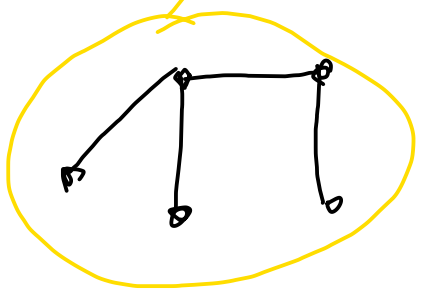
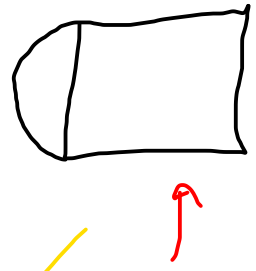
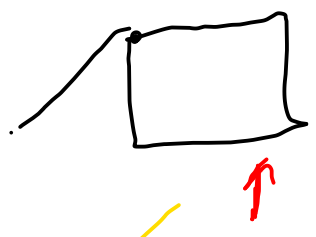
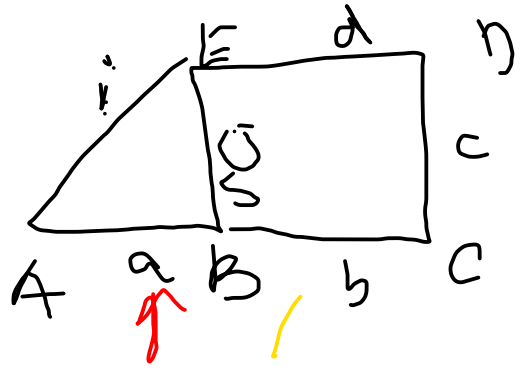


$G$



$G-e$





Tricks:

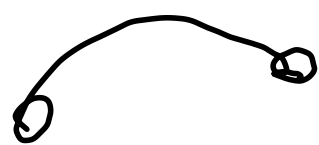
$$\chi(G) = \chi(G - \text{loops})$$

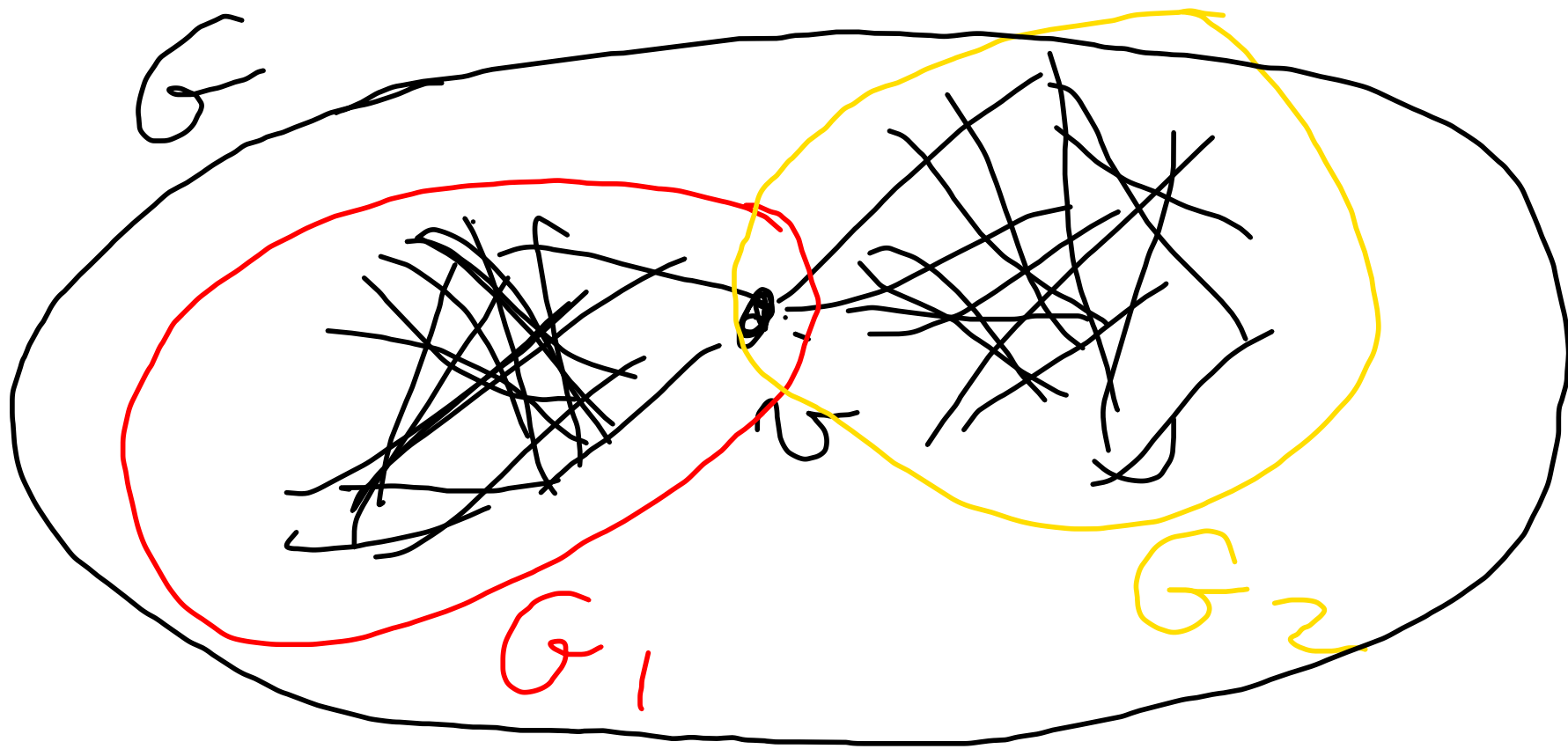
$$\chi(\text{disconnected}) = 0$$

$$\chi(\text{tree}) = 1$$

$$\chi(\text{cycle of length } k) = k$$

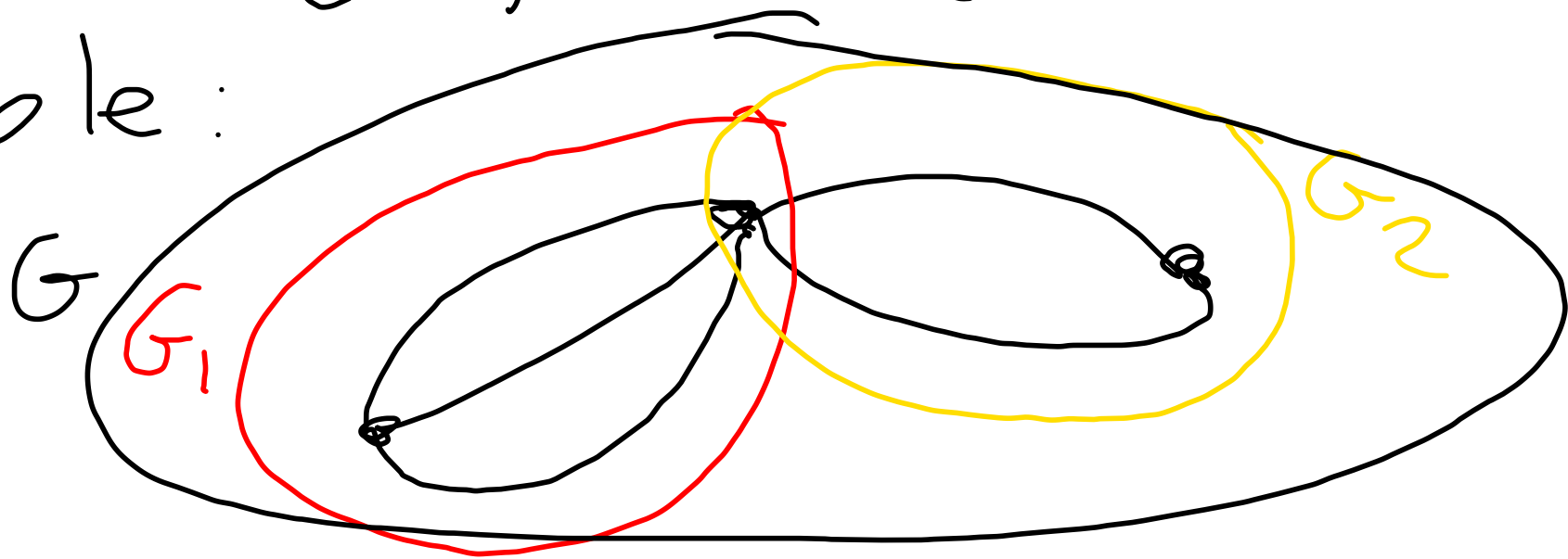
$$\chi(\text{pair of vertices joined by } h \text{ edges}) = h$$



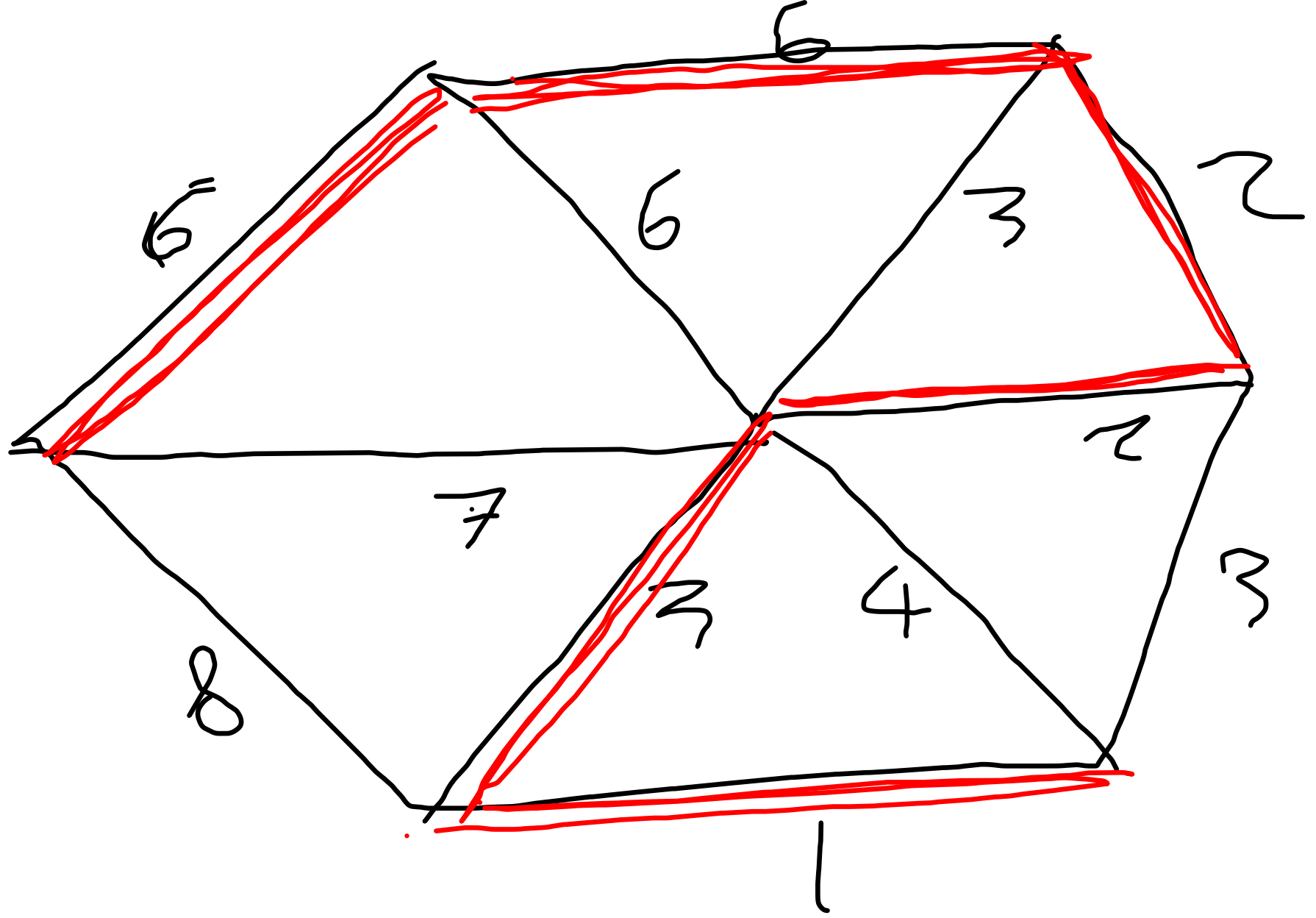


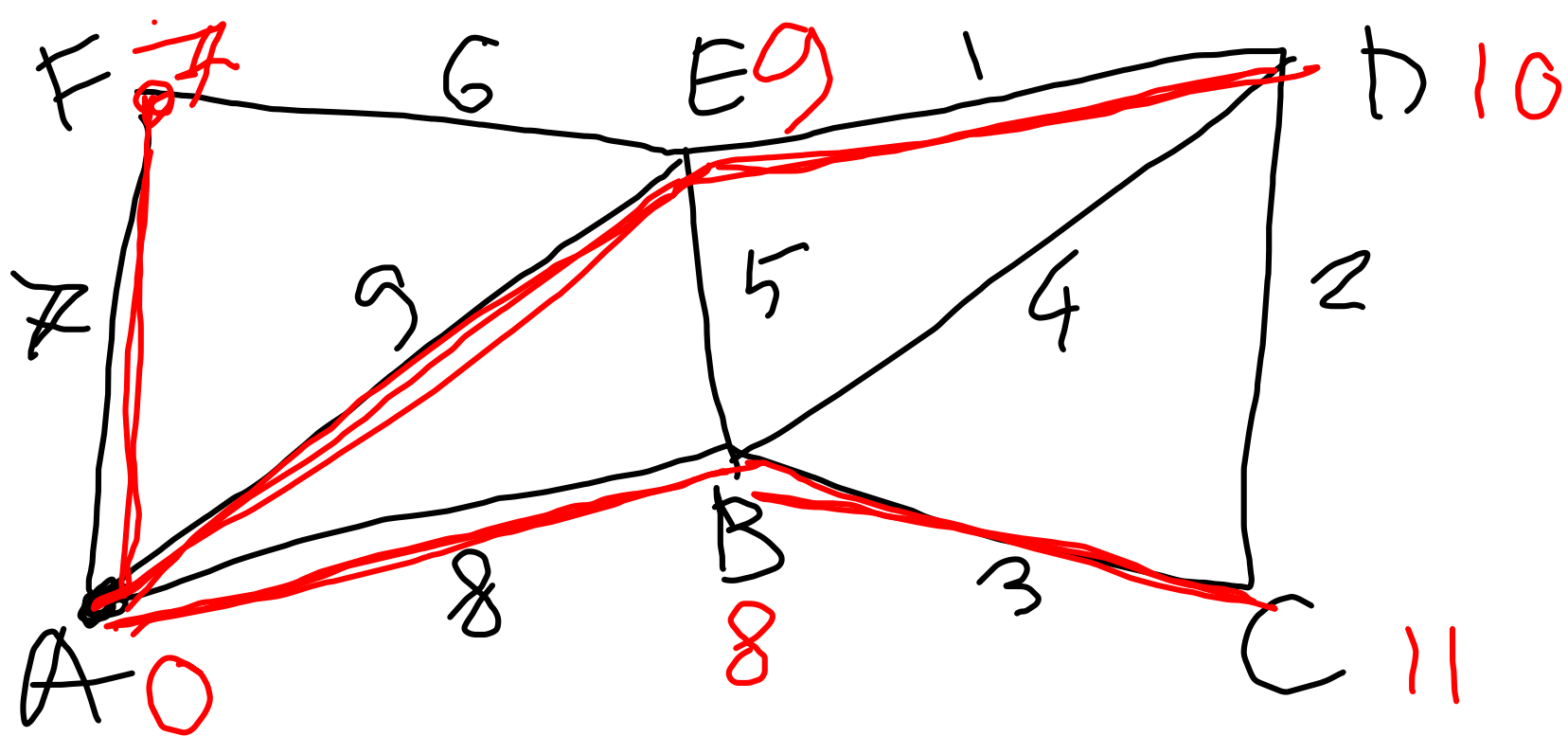
$$\tau(G) = \tau(G_1) \cdot \tau(G_2)$$

example:

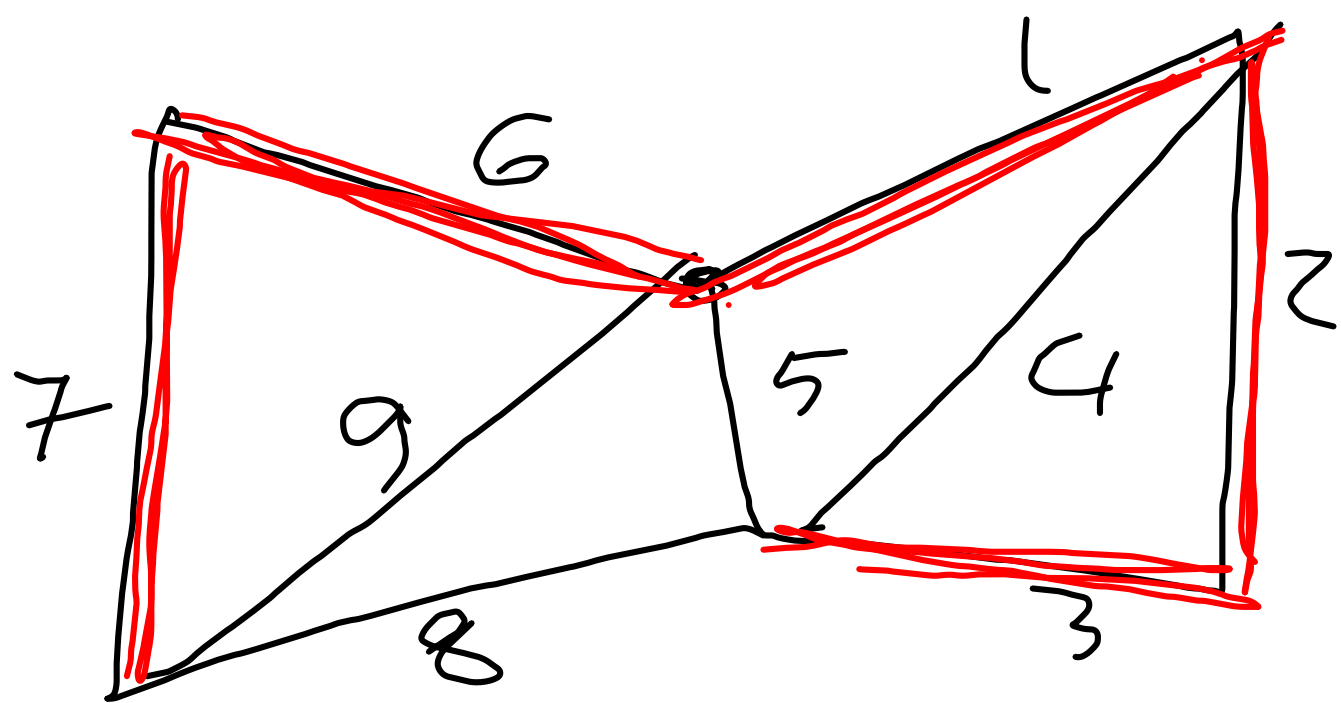


$$\begin{aligned} \tau(G_1) &= 3 \\ \tau(G_2) &= 2 \\ \tau(G) &= 3 \cdot 2 = 6 \end{aligned}$$





Dijkstra



Kruskal