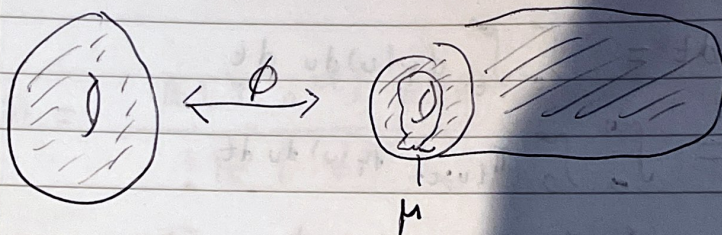
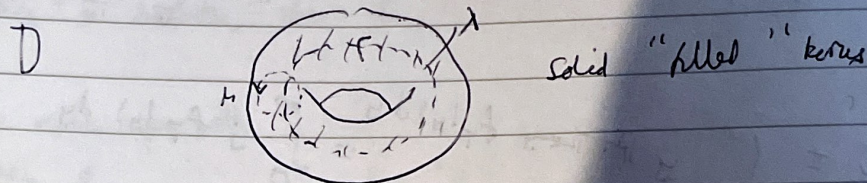
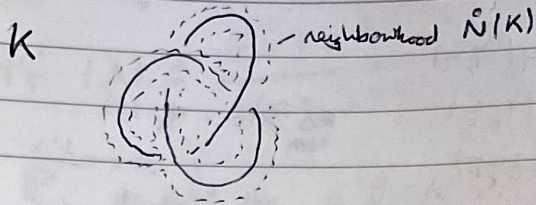
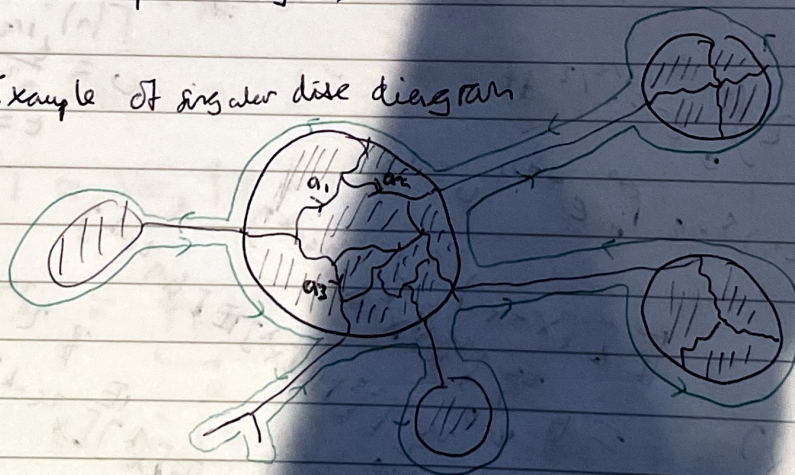


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Van Kampen diagrams

Example of singular disk diagram

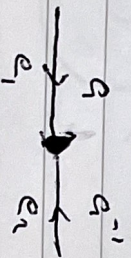
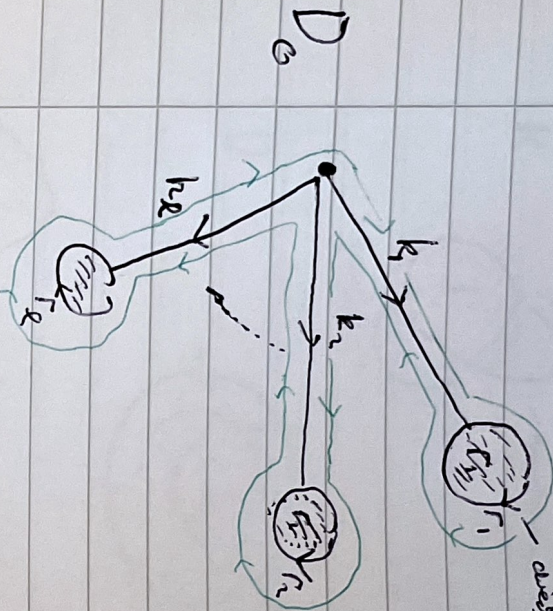




66 T

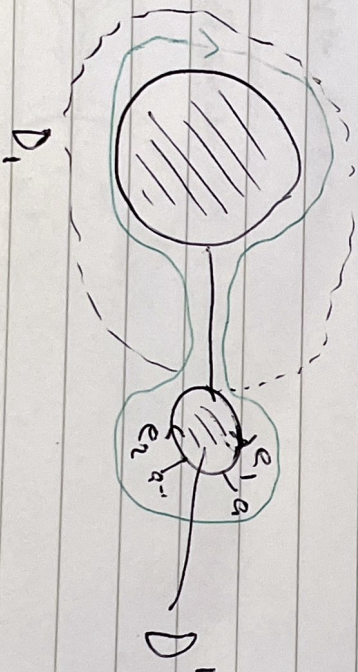
Proof of van Kampen's lemma:

direction determined by sign of  $r_1$  in  $w_0$ .

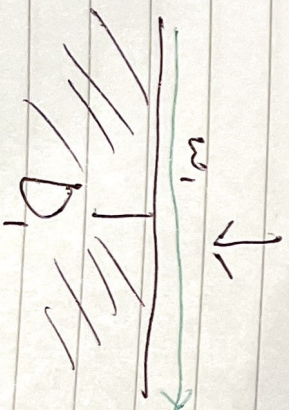
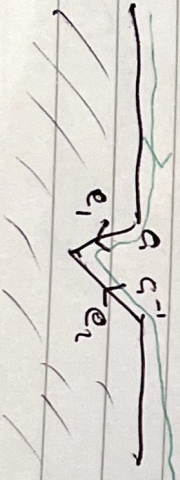


$D_0$

Case 1:

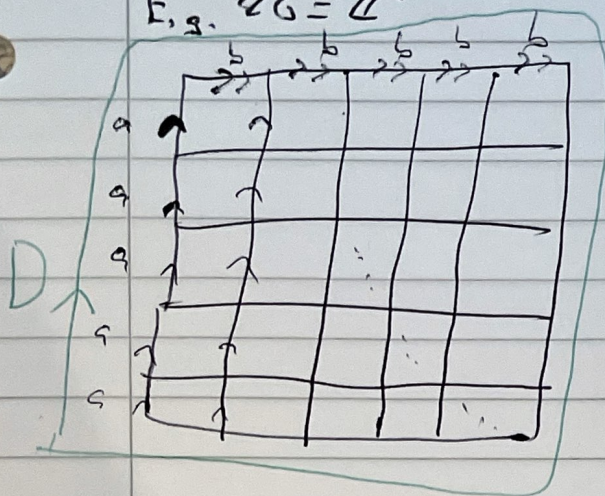


Case 2:

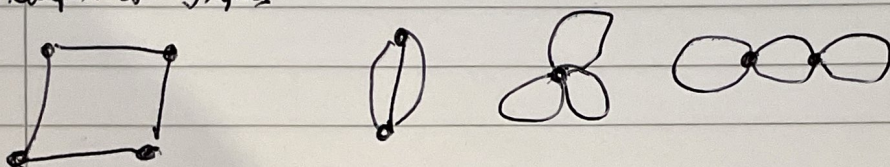




$$E, s. \mathbb{Z}G = \mathbb{Z}^2$$



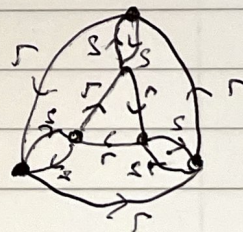
Examples of graphs



Examples of Cayley graphs

- $\{e\} = \{a, b \mid a, b\}$ ,  $\text{Cay}_{\{e, b\}}(1) =$

- $S_3 = \{r, s \mid srsr, r^3, s^2\}$ ,  $\text{Cay}_{\{r, s\}}(S_3) =$



- $\mathbb{Z} = \langle a \rangle$

$$\text{Cay}_{\{a\}}(\mathbb{Z}) = \dots \rightarrow \bullet \rightarrow \bullet \rightarrow \bullet \rightarrow \dots$$

$$\text{Cay}_{\{2, 3\}}(\mathbb{Z}) = \dots \rightarrow \bullet \rightarrow \bullet \rightarrow \bullet \rightarrow \bullet \rightarrow \bullet \rightarrow \dots$$