9 lines together always keep boundary
Homework: TFM 2.10 M. plus both

Strateg: Both pp # pp and K are

Proof: C athlete and pasting

Proposition:
The PP $\Omega$ is two glued Möbius bands.
\[
\mathcal{M}(w) = \mathbb{Z} \oplus \mathbb{Z}^2
\]

If \( \mathcal{M}(w) \leq \mathbb{Z} \oplus \mathbb{Z} \), then \( \mathcal{M}(w) \) is a free group.

Recall: \( \mathcal{M} \) is a compact surface.
If it is able to do a billion things, then

\[ \frac{p}{n} \cdot F/N \cdot \left\{ \begin{array}{ll} \frac{F/N}{F/N} & = \frac{E/F}{E/F} \\ \frac{E/F}{E/F} & = \frac{G/N}{G/N} \end{array} \right. \]

Given \( f \) is not \( \text{abelian} \) is \( G \) is \( \text{abelian} \).
Proof

Since \( \mathbb{C} \) is generated by \( \mathbb{P}(x) \), any \( \mathbb{P}(x) \) can be generated by \( \mathbb{P}(x) \).

Let \( \mathbb{F} \) be a field.

Where \( W \) is the subgroup generated by \( \{F_{i} \} \).

\[
\begin{align*}
\mathbb{F} & \cong \mathbb{F}_{\mathbb{P}(x)} \\
\mathbb{F}[F_{i}] & \cong \mathbb{F}[F_{i}] \\
\mathbb{F}[\mathbb{P}(x)] / \mathbb{F}[\mathbb{P}(x)] & \cong \mathbb{F}[\mathbb{P}(x)] / \mathbb{F}[\mathbb{P}(x)] \\
\mathbb{F} / \mathbb{F}[\mathbb{P}(x)] & \cong \mathbb{F} / \mathbb{F}[\mathbb{P}(x)] \\
\end{align*}
\]

Corollary

If \( \mathbb{F} \) is free on \( \mathbb{P}(x) \), then \( \mathbb{F} \) is a normal subgroup containing \( x \).
\[ \text{In } \mathbb{Z}_n \text{, } \{1, 2, \ldots, n\} \text{ is a group under addition.} \]

\[ \text{By } \mathbb{Z}_n^{*} \text{, group order by } \] \[ \frac{\mathbb{Z}_n^{*}}{\mathbb{Z}_n} = \frac{\mathbb{Z}_n^{*}}{\{0\}} = \mathbb{Z}_n^{*} \]

\[ \text{By } \mathbb{Z}_n^{*} \text{, core.} \]

\[ \text{Containing } \{a, b, \ldots, c\} \text{, which is } \text{a subgroup.} \]

\[ \text{With } N \text{ smallest normal group} \]

\[ \sqrt{ } \]
\[ \text{Defn: Set of generators } \]
\[ \{ x, x', x'', \ldots \text{and } y, y', y'', \ldots \} \]

\[ \text{where } \{ \text{x, x', x'', ... } \} = \{ x_1, x_2, \ldots, x_n \} \]

\[ \text{and as a } \mathbb{Z} - \text{moduler and as 14 linear} \]

\[ p(9, 9', 9'', \ldots) = 2/10', +, +, \ldots \]

\[ \text{where } V \text{ is the group generated by} \]

\[ \mathbb{Z}^n \text{ and logic } H_1 \rightarrow \mathbb{Z}^n \]

\[ (W_n) = \{ \ldots, q_n, q_{n-1}, \ldots, q_2, q_1 \} \]
null is a monomial class so all

\( (\mathbb{Z}^n, +) \) is a free abelian group on \( \{x_1, \ldots, x_n\} \)