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Lec 15 - Ex B

1. $1_X : X \to X \quad \forall x \in X$

2. • Directed graphs

   • Objects: vertices of graph

   • Morphisms: paths in graph

• Rings

   • Objects: rings

   • Morphisms: ring homomorphisms

• Top

   • Objects: topological spaces

   • Morphisms: continuous functions

3a. Group mult associative $\Rightarrow$ (i)

1 object $\Rightarrow$ (iii)

$1_* = 1_G$, group identity

b. Transitivity $\Rightarrow$ $x \leq y$ and $y \leq z \Rightarrow x \leq z$

Map well-defined

and

so assoc. holds

4. One object in $\mathcal{G}$

By axiom of group actions, identity morphism $1_* = 1_G$ mapped to identity map which is identity morphism $1_{F(*)}$ in Set.

Again by axioms of group actions,

$$F(gh)(x) = (gh) \cdot x = g \cdot (h \cdot x)$$

$$= (F(g) \circ F(h))(x)$$