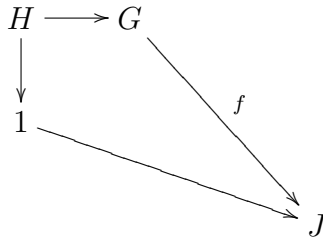


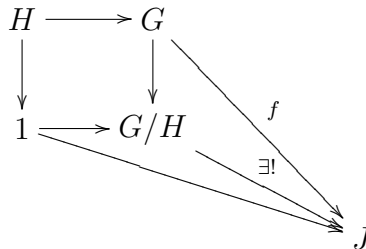
## Lecture 25: Guest lecture by Emily Riehl, Universal property of the quotient

This is what you need to remember:

**Theorem 25.1.** Let  $H \triangleleft G$ . Let  $J$  be another group, and let  $f : G \rightarrow J$  be a group homomorphism such that the diagram



commutes. Then there exists a unique homomorphism  $G/H \rightarrow J$  making all triangles and squares in the following diagram commute:



That is to say, given  $f$ , there is a unique factorization of  $f$  through  $G/H$ .