

1. Let F, G be functors from category C to category D , and let α be a natural transformation from F to G . Show that if each $\alpha_c : Fc \rightarrow Gc$ is an isomorphism, then the natural transformation α is itself an isomorphism. (Here the notion of a natural transformation being an isomorphism is made precise by considering natural transformations as arrows in the category D^C . The relevant composition is “vertical composition.” See CatsWork pp 42–43.)
2. Give an example of a functor that is full and faithful, but not an isomorphism. (Hint: Very small categories will suffice.)
3. Prove: If F is full and faithful, then $Fa \simeq Fb$ implies $a \simeq b$.
4. Do CatsWork p 41, exercise 2
5. Do CatsWork p 42, exercise 7