Topos HW; non-abelian H^1

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1

Let $\mathcal{G}$ be a sheaf of groups on some topological space X.

a.

Recall (and convince yourself) that $\mathcal{G}$ is a $\mathcal{G}$-torsor. What is the 1-cocycle corresponding to $\mathcal{G}$?

(Question to think about if you do AT2. What would the corresponding principal $\mathcal{G}$-bundle be?)

b.

Let $\mathcal{S}$ be a $\mathcal{G}$-torsor. Show that if $\mathcal{S}(X) \neq \emptyset$, then $\mathcal{S}$ is isomorphic to $\mathcal{G}$, (as sheafs of sets).

2

Let P be a presheaf of sets. Now consider a set S to be a category with objects S and only identity morphisms. This also makes P into a presheaf of categories, which is a special case of a fibered category. Show that P is separated (as a presheaf) $\iff$ P is a prestack (as a fibered category).