MATH 171 FALL 2010: HW 18

DUE MON NOV 15

(1) Prove the free category $\widehat{\Gamma}$ of the directed graph Γ is indeed a category.
(2) Verify every preordered set I can be regarded as a category.
(3) Let $\mathcal{G}ps$ be the category of groups and $\mathcal{A}b\mathcal{G}ps$ be the category of abelian groups.
Consider the assignment F,

$$F : \mathcal{G}ps \to \mathcal{A}b\mathcal{G}ps$$

given as follows. For any group G,

$$F(G) = G/G',$$

where G' is the commutator subgroup of G. Also, if $\phi : G \to H$ is a group homomorphism, then

$$F(\phi) : G/G' \to H/H'$$

is given by

$$F(\phi)(xG') = \phi(x)H',$$

for all $xG' \in G/G'$.
Prove F is a functor.

Date: November 12, 2010.