MATH 171 FALL 2010: PROBLEM SET 17

DUE THU NOV 11

(1) Prove that a morphism in the category $\mathcal{S}ets$ is a monomorphism if and only if it is injective.
(2) Prove that a morphism in the category $\mathcal{S}ets$ is an epimorphism if and only if it is surjective.
(3) Prove that the inclusion map $\mathbb{Z} \hookrightarrow \mathbb{Q}$ is an epimorphism in the category of rings.
(4) Let α, β be morphisms in a category $\mathcal{C}$ and suppose $\alpha\beta$ is defined.
    (a) Prove if both α and β are monomorphisms, then $\alpha\beta$ is a monomorphism.
    (b) Prove $\alpha\beta$ is a monomorphism implies β is a monomorphism.