

## PHI 312 : pset 2

1. Let  $f : X \rightarrow Y$  and  $g : Y \rightarrow Z$  be functions. Show that if  $g \circ f$  is a monomorphism, then  $f$  is a monomorphism. [You shouldn't have to mention elements of the sets.]
2. Let  $f : X \rightarrow Y$  be a function, and let  $\delta_Y : Y \rightarrow Y \times Y$  be the diagonal map. Show that  $\delta_Y \circ f = \langle f, f \rangle$ . [Again, you shouldn't have to mention elements of the sets.]
3. Show that if  $f : X \rightarrow Y$  is surjective, then  $f$  is an epimorphism.
4. Show that  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ . [Use the definitions of  $\cap$  and  $\cup$  in terms of "and" and "or".]