

HWK #1, DUE WEDNESDAY 01/15

1. Let \mathbb{I} be the category consisting of two objects and four morphisms, the two identity maps and two morphisms going from the first object to the second.
 - (i) Show that to give a functor $F: \mathbb{I} \rightarrow \mathcal{C}$ is the same as to pick two objects X and Y of \mathcal{C} and two morphisms $f_i: X \rightarrow Y$, $i = 1$ and 2 .
 - (ii) The equaliser of f_1 and f_2 is the limit of the corresponding functor. Identify the equaliser in the category of sets.
 - (iii) Let \mathcal{C} be a category which admits products. Show that \mathcal{C} admits fibre products if and only if it admits equalisers.
2. Hartshorne: Chapter II, 2.7, 2.16, 2.17, 3.1-3.4.