

MATH 551 HOMEWORK 3

DUE WEDNESDAY, SEPTEMBER 28

You are encouraged to work on the homework together, but your final write-up should be your own. No late homework will be accepted. “Hungerford I.1.3” means Question 3 in the exercises at the end of Section 1 of Chapter 1.

- (1) Hungerford I.7.1
- (2) Hungerford I.7.2
- (3) Hungerford X.1.1a
- (4) Hungerford X.1.2
- (5) Hungerford X.1.3
- (6) Hungerford X.1.4a
- (7) Let X be a topological space, and let \mathcal{X} be the category whose objects are the open sets of X , and for which there is a morphism $U \rightarrow V$ exactly when $U \subseteq V$, in which case $\text{hom}(U, V)$ is a single element. Do products always exist in this category?
- (8) Let F be the map from \mathcal{X} to the category of groups that takes an object U of \mathcal{X} to the group of continuous functions from X to \mathbb{R} . Show that you can define a map on morphisms in such a way that F becomes a functor. (This is an example of *presheaf*).