Homework 11

Math 300 (section 901), Fall 2021

This homework is due on Wed., Nov. 10. (Turn in your answers to questions 1–3.)
You may cite results from class, as appropriate.

0. *(This problem is NOT to be turned in.)*
   (a) Read Sections 9.4–9.6, 10.1–10.2
   (b) Section 9.3 #9.24, 9.30
   (c) Section 9.4 #9.38
   (d) Section 9.5 #9.44, 9.46, 9.53
   (e) Section 9.6 #9.56, 9.59, 9.60
   (f) Section 10.1 #10.2, 10.23, 10.25, 10.26
   (g) Section 10.2 #10.18, 10.23, 10.25, 10.26

1. *Prove or disprove the following:*
   (a) If R_1 and R_2 are equivalence relations on a set A, then $R_1 \cap R_2$ is an equivalence relation on A.
   (b) If R_1 and R_2 are equivalence relations on a set A, then $R_1 \cup R_2$ is an equivalence relation on A.

2. In class we proved that addition in $\mathbb{Z}_n$ is well defined (Theorem 9.17). Prove that multiplication in $\mathbb{Z}_n$ is also well defined.

3. (a) Section 9.3 #9.28
   (b) Section 9.4 #9.40
   (c) Section 9.5 #9.48
   (d) Section 9.6 #9.54
   (e) Section 10.1 #10.4, 10.6(a–c), 10.10, 10.12(b and d) – and for (b) give an example to show that the containment in (b) might not be equality (see also #10.29).
   (f) Section 10.2 #10.19, 10.22, 10.29