

Homework 4
due Thursday July 16th

1. Section 3.3 # 8(b).
2. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be the function given by $f(x) = x^2 + 2x$. Let $R \subseteq \mathbb{R} \times \mathbb{R}$ be the relation defined by $(x, y) \in R$ iff $f(x) = f(y)$. Describe the equivalence classes x/R , and the set of equivalence classes \mathbb{R}/R .
3. A **word** of length n on a set A is a string $a_1 \dots a_n$, where each $a_i \in A$ is called a **letter**. For example, 213233 is a word of length 6 on the set $\{1, 2, 3\}$.
 - (a) Let M_4 be the set of all words of length 4 on the set $\{1, 2, 3, 4\}$. How many elements are in M_4 ?
 - (b) Define the relation $R \subseteq M_4 \times M_4$ by $(u, v) \in R$ iff u is a permutation of v (in other words, u is obtained from v by reordering the letters in v). Explain why R is an equivalence relation.
 - (c) Describe the set of equivalence classes M_4/R , where R is the relation defined in 3b. How many distinct equivalence classes are there? How many elements are in each equivalence class?
4. Section 3.4, # 7, 10.
5. Section 4.1 # 1(c)(d)(e), 3(e)(i), 17.