Homework

due on Wednesday, March 16

Read carefully section 6.1 in the book. Solve the following problems.

Problem 1. Let $f : A \longrightarrow B$ be a function. Let R be a relation on A defined by $R = \{(x, y) \in A \times A : f(x) = f(y)\}$. In other words, xRy if and only if $f(x) = f(y)$. Prove that R is an equivalence relation. What are the equivalence classes of R? (describe them in terms of the notion of preimage).

Problem 2. Let $A = \{a, b, c\}$ be a set with three elements. Describe all possible equivalence relations on A (use the correspondence between eqivalence relations and partitions).

Problem 3. Let $A = \mathbb{Q}$ be the set of all rational numbers. Define a relation R on A as follows: pRq if and only if $p - q$ is an integer. Prove that R is an equivalence relation. What is the equivalence class of 1? What is the equivalence class of $1/2$? (You may use all the basic properties of rational numbers)