

Assignment 13

Due in class Thursday of Week 4

1. Consider the set $A = \{1, 2, 3, 4, 5\}$ consisting of five elements. We define a relation R on A via xRy if and only if the product xy is even. Determine if R is an equivalence relation, and if so find the equivalence classes.
2. Suppose U is a set of five elements, $U = \{a, b, c, d, e\}$. We then consider the set $A = P(U)$, the powerset of U , which consists of all subsets of U . We define on A two relations (so these relations take as elements subsets of U). The first, R_1 , is defined by saying that two subsets B_1, B_2 of U are related if and only if their intersection $B_1 \cap B_2$ is nonempty. The second, R_2 , is defined by saying that two subsets B_1, B_2 of U are related if and only if their union $B_1 \cup B_2$ is nonempty. Are these relations equivalences? Prove or disprove.
3. Consider a set A and a relation R on A with the following properties:
 - R is reflexive and transitive.
 - For every x in A there is a y in A such that xRy (i.e. every element is related to *some* element, which may or may not be equal to it).

Then show that R is also symmetric.