

Math 160 Logic Assignment # 14

1. Suppose (S, \sim) is an equivalence relation and suppose $a, b \in S$. Show $[a] = [b]$ if $a \sim b$ and $[a] \cap [b] = \emptyset$ if $a \not\sim b$.
2. Consider the relation \sim on \mathbb{R} defined by $a \sim b$ if $\frac{a-b}{\sqrt{2}} \in \mathbb{Z}$.
 - (a) Show (\mathbb{R}, \sim) is an equivalence relation.
 - (b) Describe $[\frac{5}{2}]$.
3. Suppose R is a symmetric and transitive relation on S . Further suppose that for all $a \in S$ there exists a $b \in S$, such that aRb . Show that R is in fact an equivalence relation on S .
4. Suppose $S \neq \emptyset$. Let $R = \emptyset$ be a relation on S (i.e. $a \not R b$, for all $a, b \in S$). Is (S, R) :
 - (a) Reflexive
 - (b) Symmetric
 - (c) Antisymmetric
 - (d) Transitive