

MA1124 Assignment3

[due Monday 2 February, 2015]

1. Define $x \sim y$ means $xy \geq 0$. Prove this is an equivalence relation. Find the subset R of $\mathbb{R} \times \mathbb{R}$ which defines the relation. Find the equivalence classes.
2. Is the following argument correct? Symmetry says $a \sim b$ implies $b \sim a$, but then by transitivity $a \sim a$. So we don't need the reflexive axiom.
3. For the equivalence relation $(a,b) \sim (c,d)$ means $a+d = b+c$, find the equivalence classes and give a nice set of equivalence class representatives.
4. Prove that if $f : X \rightarrow Y$ is a function then $f(A \cap B) = f(A) \cap f(B)$ for all subsets A and B if and only if f is one to one.
5. Is $f(A^c) = f(A)^c$ for all subsets A ?