

CS4104 Spring 2007 Homework Assignment 6
Due at 11:00pm on Tuesday, February 27
50 Points

1. [20 points] For each relation below, explain why the relation does or does not satisfy each of the properties reflexive, symmetric, antisymmetric, and transitive.
 - (a) “isBrotherOf” on the set of people.
 - (b) “isFatherOf” on the set of people.
 - (c) The relation $R = \{\langle x, y \rangle \mid x^2 + y^2 = 1\}$ for real numbers x and y .
 - (d) The relation $R = \{\langle x, y \rangle \mid x^2 = y^2\}$ for real numbers x and y .
 - (e) The relation $R = \{\langle x, y \rangle \mid x \bmod y = 0\}$ for $x, y \in \{1, 2, 3, 4\}$.

2. [10 points] Show that big-Theta notation (Θ) defines an equivalence relation on the set of functions.

3. [20 points]
 - (a) Present an adversary argument as a lower bounds proof to show that $n - 1$ comparisons are necessary to find the maximum of n values in the worst case.
 - (b) Present an adversary argument as a lower bounds proof to show that n comparisons are necessary in the worst case when searching for an element with value X (if one exists) from among n elements.