

Equivalence Relations

Aaron Bloomfield

CS 202

Epp, section ???

Introduction

- Certain combinations of relation properties are very useful
 - We won't have a chance to see many applications in this course
- In this set we will study equivalence relations
 - A relation that is reflexive, symmetric and transitive
- Next slide set we will study partial orderings
 - A relation that is reflexive, antisymmetric, and transitive
- The difference is whether the relation is symmetric or antisymmetric

Equivalence relations

- A relation on a set A is called an *equivalence relation* if it is reflexive, symmetric, and transitive
- Consider relation $R = \{ (a,b) \mid \text{len}(a) = \text{len}(b) \}$
 - Where $\text{len}(a)$ means the length of string a
 - It is reflexive: $\text{len}(a) = \text{len}(a)$
 - It is symmetric: if $\text{len}(a) = \text{len}(b)$, then $\text{len}(b) = \text{len}(a)$
 - It is transitive: if $\text{len}(a) = \text{len}(b)$ and $\text{len}(b) = \text{len}(c)$, then $\text{len}(a) = \text{len}(c)$
 - Thus, R is a equivalence relation