COSC 341 – Tutorial 2

1. Let $A = \{a, b, c\}$ be a set.
   (a) Define a relation R on A that is irreflexive, asymmetric, and not transitive
   (b) Extend R to a relation R' that is reflexive
   (c) Extend R' to a relation R'' that is symmetric
   (d) Extend R'' to a relation R''' that is transitive
2. Are the following relations reflexive, symmetric, transitive? If they are: How many equivalence classes do they have?
   (a) $\sim$ on $\mathbb{N}$ with: $a \sim b \iff a$ devides b ($\frac{b}{a} \in \mathbb{N}$)
   (b) $\sim$ on $\mathcal{P}(\mathbb{N})$ with: $A \sim B \iff A \cap B = \emptyset$
   (c) $\sim$ on $\mathbb{N}$ with: $a \sim b \iff a$ and b have the same last digit
3. Show that the set of even natural numbers is countable.

Homework

1. Are the following relations reflexive, symmetric, transitive? If they are: How many equivalence classes do they have?
   (a) $\sim$ on $\mathcal{P}(\mathbb{N})$ with: $A \sim B \iff A \subseteq B$
   (b) $\sim$ on $\mathbb{N}$ with: $a \sim b \iff a - b$ is a multiple of 8
   (c) $\sim$ on $\mathcal{P}(\mathbb{N})$ with: $A \sim B \iff A \cap B \neq \emptyset$
2. Show that the set of even integers is countable.