HOMEWORK 9

MATH 2001

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ABSTRACT. This is the first homework assignment. The problems are from Hammack [**?**, Ch. 11, §11.1]:

- **Chapter 11 Section 11.1**, Exercises: 2, 6, 10.

CONTENTS

CHAPTER 11 SECTION 11.1

Ch.11, §11.1, Exercise 2. Consider the relation $R = \{(a,b),(a,c),(c,b),(b,c)\}$ on set $A = \{a,b,c\}$. Is R reflexive? Symmetric? Transitive? If a property does not hold, say why.

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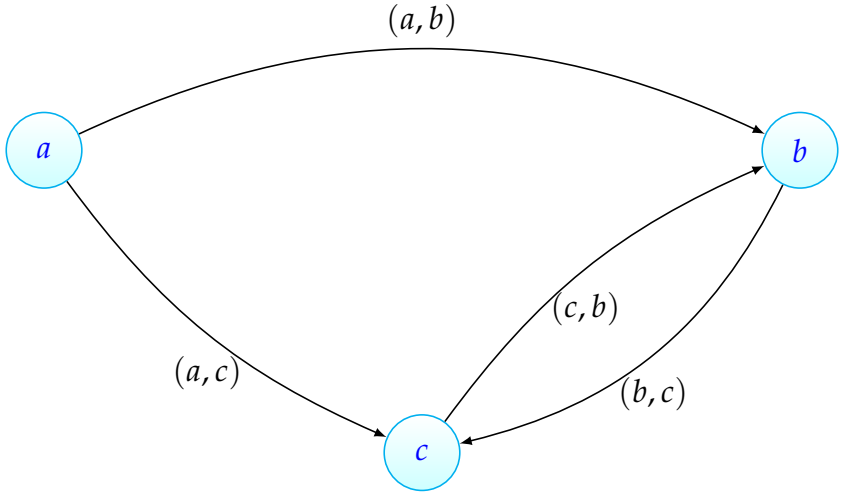
Solution to Ch.11, §11.1, Exercise 2.



The graph is not reflexive, because $(a, a) \notin R$.

The graph is not Symmetric, because $(a, b) \in R$ *and* $(b, a) \notin R$.

The Graph is trasitive, because $(a, c) \in R$, $(c, b) \in R$ and $(a, b) \in R$.

□

Ch.11, §11.1, Exercise 6. Consider the relation $R = \{(x, x) : x \in \mathbb{Z}\}$ on $\mathbb{Z}$. Is R reflexive? Symmetric? Transitive? If Property does not hold, say why.

Solution to Ch.11, §11.1, Exercise 6.

The Graph is reflexive, because for every $x \in Z$ there is a relation of $(x, x) \in R$.

The graph only contians self-to-self relations, so it is not transitive or symmetric. □

Ch.11, §11.1, Exercise 8. Define a relation on $\mathbb{Z}$ as xRy if $|x - y| < 1$. Is R reflexive? Symmetric? Transitive?

Solution to Ch.11, §11.1, Exercise 8.

$$|x - y| < 1$$

$$-1 < x - y < 1$$

$$x + 1 > y > x - 1$$

$$y \in \mathbb{Z}$$

$$y = x$$

The graph is transitive, because for every $x \in \mathbb{Z}$, there is a relation $(x, y) \in \mathbb{R}$, where $y = x$.

The graph only contains self-to-self relations, so it is not Symmetric or Transitive.

□

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