

Lab 4

CS 135

Problem 1

Let R be $\{(1, 1), (2, 1), (3, 2), (4, 3)\}$.

Find R^2 .

Then find R^3 .

Then find R^4 .

Problem 1 Answer Key

$$R = \{(1, 1), (2, 1), (3, 2), (4, 3)\}$$

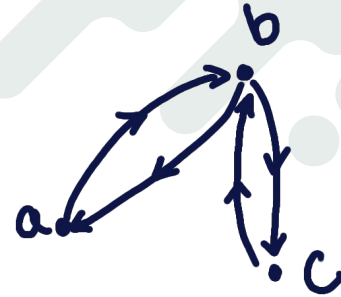
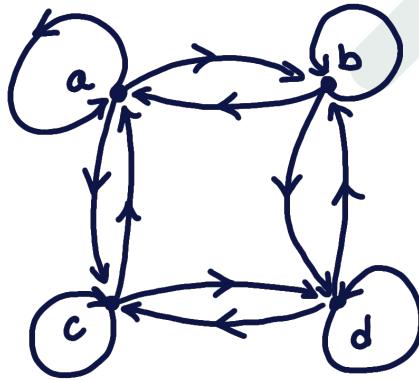
$$R^2 = R \circ R = \{(1, 1), (2, 1), (3, 1), (4, 2)\}$$

$$R^3 = R^2 \circ R = \{(1, 1), (2, 1), (3, 1), (4, 1)\}$$

$$R^4 = R^3 \circ R = \{(1, 1), (2, 1), (3, 1), (4, 1)\}$$

Problem 2

Determine whether the following directed graphs are equivalence classes.



Problem 2 Answer Key

1. Yes
2. No
3. No



Problem 3

Let $R = \{(a, b): a, b \in \mathbb{N}, \text{rem}(a, 2) = \text{rem}(b, 2)\}$ (the remainders of both numbers when divided by 2 are equal).

- a. Describe the elements of the set $[0]_R$ and $[1]_R$
- b. How many distinct equivalence classes of the natural numbers are created by R

Problem 3 Answer Key

- a. $[0]_R = \{x \in \mathbb{N} : \text{rem}(x, 2) = 0\}$
 $[1]_R = \{x \in \mathbb{N} : \text{rem}(x, 2) = 1\}$
- b. 2; $[0]$ and $[1]$

The background features a vibrant green gradient with dynamic white and light green diagonal stripes and circles of varying sizes, creating a sense of movement and energy.

Racket Time!