

CSE 280 Challenge Set 05

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Question 1

For each relation below, determine which property they satisfy. Each relation has the domain of \mathbf{R} . Remember to use a digraph if you need help.

Relation	Reflexive, Anti-Reflexive or Neither	Symmetric, Anti-Symmetric or Neither	Transitive	Equivalence
aRb , if $a^2 = b^2$				
aRb , if $\lfloor a \rfloor = b$				
aRb , if $a - b \geq 0$				
aRb , if $-a - b = 1$				
aRb , if $a - b = 5$				

Question 2

Determine if each of the following relations are equivalences and why. The domain for these relations is $\{A, B, C, D\}$?

- $\{(A, B), (B, A), (C, D), (D, C)\}$
- $\{(A, A), (B, B), (C, C), (D, D), (A, B), (B, A), (C, D), (D, C)\}$
- $\{(A, B), (B, C), (C, B), (B, A), (A, A), (B, B), (C, C), (D, D)\}$
- $\{(A, A), (B, B), (C, C), (D, D), (A, B), (B, C), (A, D), (A, C), (D, C)\}$

Question 3

For the following parts, assume that the domain of each relation is $\{A, B, C\}$. There may be more than one correct answer for each part.

Part 1

Draw a digraph of a relation that satisfies only the reflexive property.

Part 2

Draw a digraph of a relation that satisfies only the symmetric property.

Part 3

Draw a digraph of a relation that is an equivalence.

Part 4

Draw a digraph of a relation that satisfies both reflexive and transitive properties only.

Part 5

Draw a digraph of a relation that is both an equivalence and anti-symmetric (this is not a trick question ... it is possible).

Question 4

Part 1

Define the relationship aR_b if a and b have the same remainder when divided by 5. The domain of a and b is \mathbf{Z} . Identify all of the equivalence classes and their contents.

Part 2

Identify the equivalence classes for all of the equivalence relations from Question 1 above.