7/20 Math 226 Class Notes

Section 8.1 Relations and Their Properties

Homework Pages 527 – 529 #1, 3, 7, 29, 33a,c,e, 35 a,c,e



 denotes 

denotes 

When (a,b) belongs to R, a is said to be related to b by R.

Relation R on sets A and B is any subset of A x B

There can be a theme to the relation, for example:

R from Y = {1, 2, 3, 4, 5} to itself where   
R = {(a, b) in (Y x Y) | a < b} = {(1, 2), (1, 3), (1, 4), (1, 5), (2, 3), (2, 4), (2, 5), (3, 4), (3, 5), (4, 5)}

Like S from Z to Z where

S = {(a, b) in (Z x Z) | a2 = b2} which ends up being all pairs (a, +-a) for each a in Z.

or can just be something random like T from {0,1,2} to {1,2,3,4}, where

T = {(0, 2), (1, 2), (1, 4)} (this is a subset of {0,1,2} x {1,2,3,4})

Functions:

Example: {1, 2, 3} -> {a, b, c}

Function: Not a Function:

Both are relations.



A screenshot of a cell phone

Description automatically generated

A picture containing object

Description automatically generated

Properties of Relations:

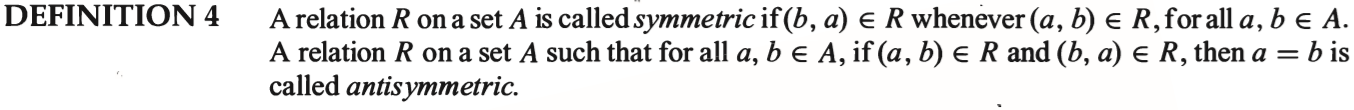


Example:

Which relations are reflexive?

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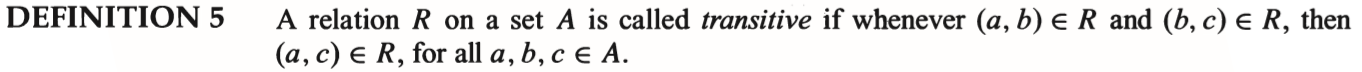


Example:

Which of the following relations is symmetric?

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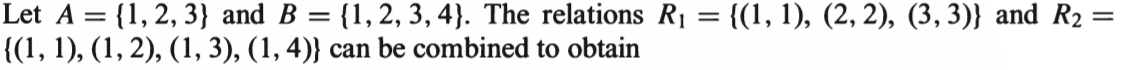
Example: Which of the following relations are transitive?

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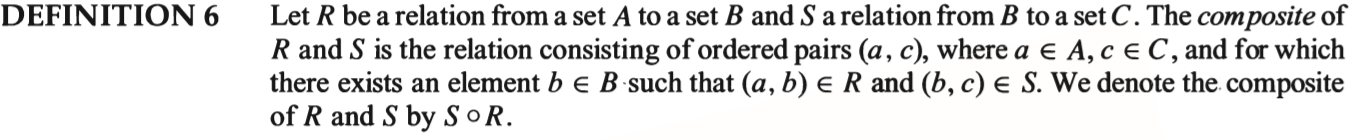
Combining Relations:

Example:

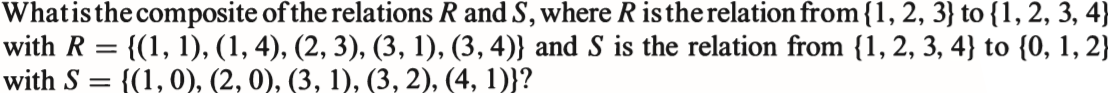


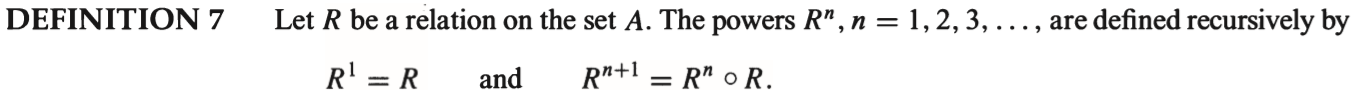
A close up of a clock

Description automatically generated



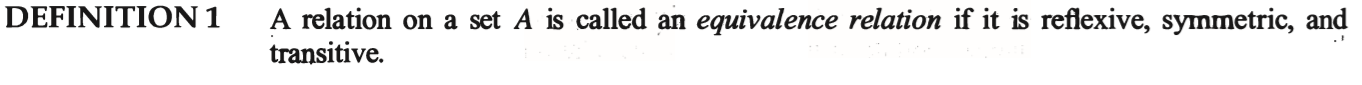
Example:





Section 8.5 Equivalence Relations

Homework Pages 562 – 566 #1, 3



Example:

Are any of these relations equivalence relations?

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