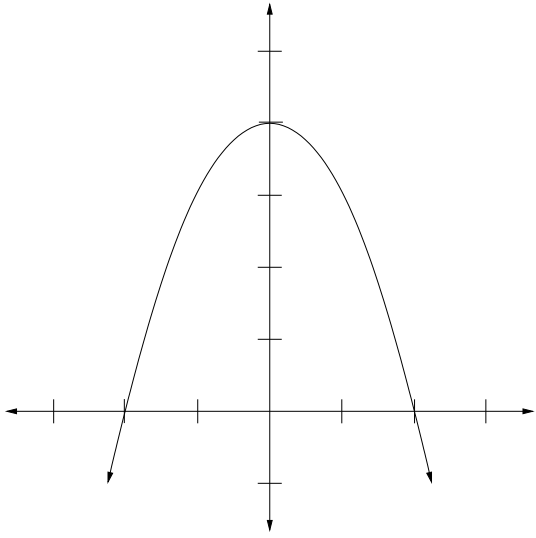
Chapter 5 roadmap:

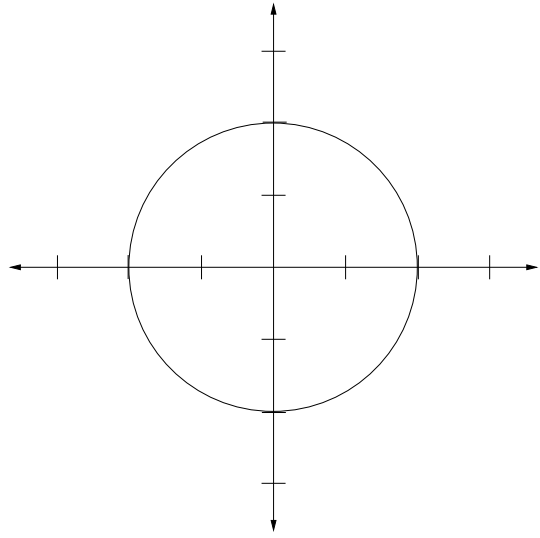
- Introduction to relations (**Today**)
- Properties of relations (Wednesday and Friday)
- Transitive closure (next week Friday)
- Partial order relations (the following Monday)
- Review for Test 2 (the following Wednesday)

Today: Introduction relations

- Definition
- Examples
- Other terms
  - Image
  - Inverse
  - Composition
- Code representation
- Proofs



$y = 4 - x^2$



$y^2 = 4 - x^2$

Consider the set of students $\{\text{Alice}, \text{Bob}, \text{Carol}, \text{Dave}\}$. Suppose they all sit in the front row, with this seating arrangement:

Dave	Alice	Carol	Bob

Consider the relation *sitsNextTo* on this set. Determine which of the following are true.

$\text{Carol} \in \textit{sitsNextTo}$

$(\text{Dave}, \text{Alice}) \in \textit{sitsNextTo}$

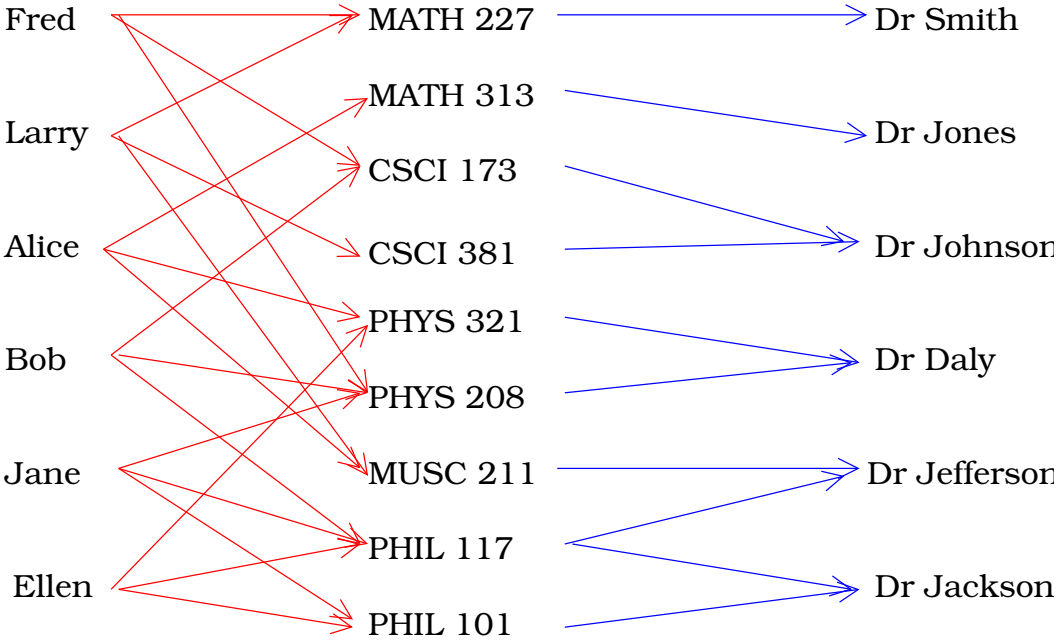
$(\text{Dave}, \text{Bob}) \in \textit{sitsNextTo}$

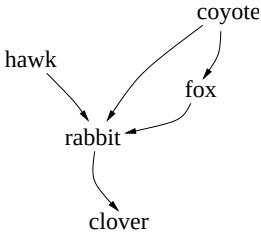
$(\text{Alice}, \text{Carol}) = \textit{sitsNextTo}$

$\textit{sitsNextTo} = \{\text{Dave}, \text{Alice}, \text{Carol}, \text{Bob }\}$

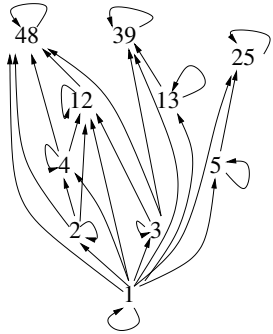
$\textit{sitsNextTo} =$
$\{(\text{Alice}, \text{Carol}), (\text{Alice}, \text{Dave}), (\text{Bob}, \text{Carol}), (\text{Carol}, \text{Alice}), (\text{Carol}, \text{Bob}), (\text{Dave}, \text{Alice})\}$

$\textit{sitsNextTo} = \{(\text{Dave}, \text{Alice}), (\text{Alice}, \text{Carol}), (\text{Carol}, \text{Bob}).$

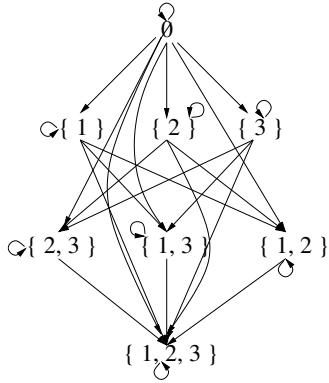

Fred
Larry
Alice
Bob
Jane
Ellen
MATH 227
MATH 313
CSCI 173
CSCI 381
PHYS 321
PHYS 208
MUSC 211
PHIL 117
PHIL 101
Dr Smith
Dr Jones
Dr Johnson
Dr Daly
Dr Jefferson
Dr Jackson



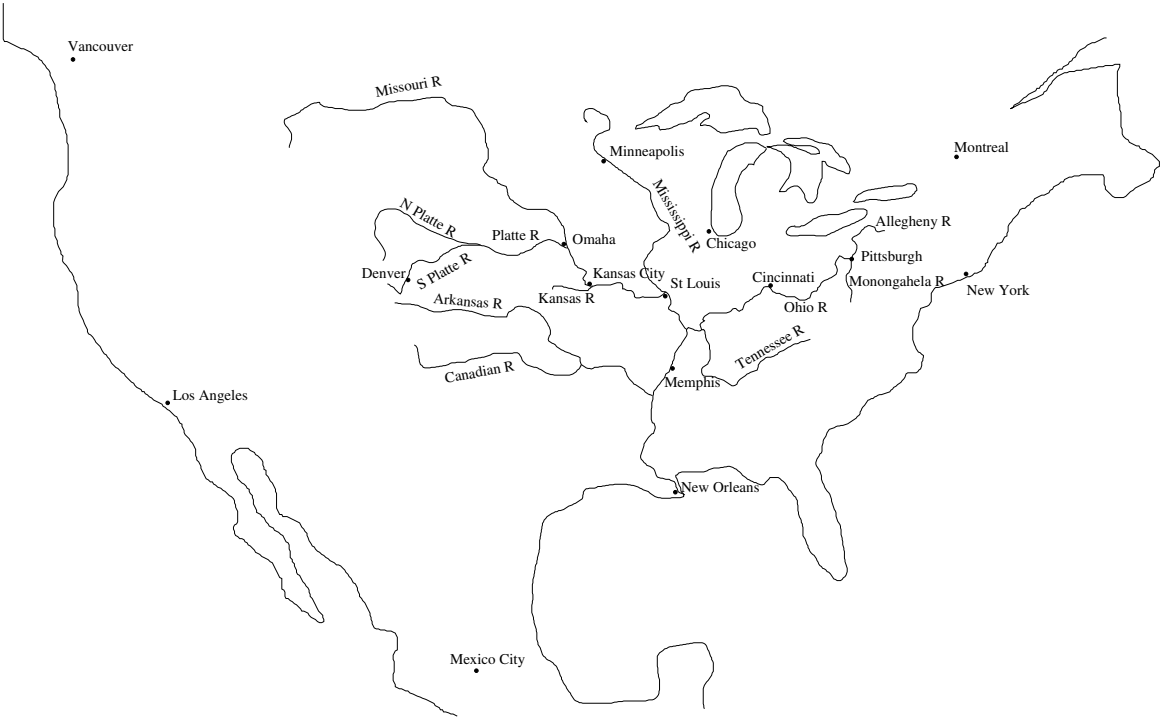
eats

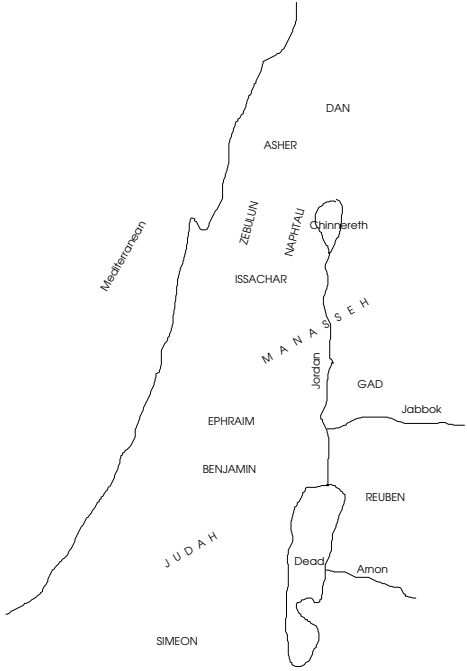


| (divides)



$\subseteq$ (subset)


Vancouver
Missouri R
Minneapolis
Montreal
Mississippi R
N Platte R
Platte R
Omaha
Chicago
Allegheny R
Pittsburgh
Denver
S Platte R
Kansas City
St Louis
Cincinnati
Monongahela R
New York
Arkansas R
Kansas R
Ohio R
Tennessee R
Canadian R
Memphis
Los Angeles
New Orleans
Mexico City


DAN
ASHER
ZEBULUN
NAPHTALI
Chinnereth
Mediterraneen
ISSACHAR
M A N A S S E H
Jordan
GAD
Jabbok
EPHRAIM
BENJAMIN
REUBEN
J U D A H
Dead
Amon
SIMEON

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For next time:

Pg 205: 5.3.(8, 10, 12, 13)

Read 5.4