FOCS

Foundations of Computer Science

Fundamentele Informatica 1

Bachelor
Informatica / I&E / BioInf / K.I.

Universiteit
Leiden
Leiden Institute of
Advanced Computer Science

docenten

Hendrik Jan Hoogeboom

Jeannette de Graaf

studentassistenten

video’s + dictaat + opgaven + discussie

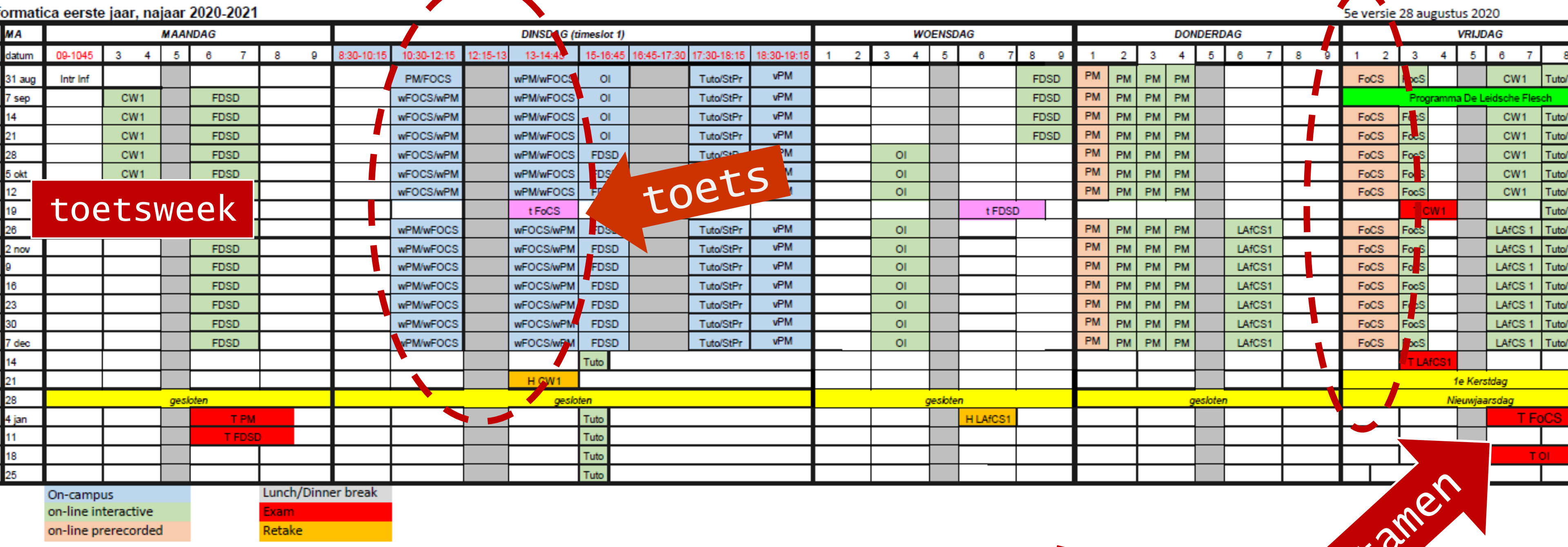
brightspace.universiteitleiden.nl/d2l/home/15880

rooster I

“on-line prerecorded”

werkgroep

college



ormatica eerste jaar, najaar 2020-2021

5e versie 28 augustus 2020

MA	MAANDAG					DINSDAG (timeslot 1)								WOENSDAG					DONDERDAG							VRIJDAG					
datum	09-1045	3 4	5	6 7	8 9	8:30-10:15	10:30-12:15	12:15-13	13-14:45	15-16:45	16:45-17:30	17:30-18:15	18:30-19:15	1 2	3 4	5	6 7	8 9	1	2	3	4	5	6 7	8 9	1 2	3	4	5	6 7	8
31 aug	Intr Inf						PM/FOCS		wPM/wFOCS	OI		Tuto/StPr	vPM					FDSD	PM	PM	PM	PM				FoCS	FocS			CW1	Tuto/
7 sep		CW1		FDSD			wFOCS/wPM		wPM/wFOCS	OI		Tuto/StPr	vPM					FDSD	PM	PM	PM	PM				Programma De Leidsche Flesch					
14		CW1		FDSD			wFOCS/wPM		wPM/wFOCS	OI		Tuto/StPr	vPM					FDSD	PM	PM	PM	PM				FoCS	FocS			CW1	Tuto/
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28		CW1		FDSD			wFOCS/wPM		wPM/wFOCS	FDSD		Tuto/St	PM		OI				PM	PM	PM	PM				FoCS	FocS			CW1	Tuto/
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26							wPM/wFOCS		wFOCS/wPM	FDS		Tuto/StPr	vPM		OI				PM	PM	PM	PM		LAfCS1		FoCS	FocS			LAfCS 1	Tuto/
2 nov				FDSD			wPM/wFOCS		wFOCS/wPM	FDSD		Tuto/StPr	vPM		OI				PM	PM	PM	PM		LAfCS1		FoCS	FocS			LAfCS 1	Tuto/
9				FDSD			wPM/wFOCS		wFOCS/wPM	FDSD		Tuto/StPr	vPM		OI				PM	PM	PM	PM		LAfCS1		FoCS	FocS			LAfCS 1	Tuto/
16				FDSD			wPM/wFOCS		wFOCS/wPM	FDSD		Tuto/StPr	vPM		OI				PM	PM	PM	PM		LAfCS1		FoCS	FocS			LAfCS 1	Tuto/
23				FDSD			wPM/wFOCS		wFOCS/wPM	FDSD		Tuto/StPr	vPM		OI				PM	PM	PM	PM		LAfCS1		FoCS	FocS			LAfCS 1	Tuto/
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18										Tuto																					T OI
25										Tuto																					

On-campus
on-line interactive
on-line prerecorded

Lunch/Dinner break
Exam
Retake

toetsweek

toets

er is ook herkansing

tentamen

toets en tentamen

toets test jezelf!

2 uur, tien opgaven

10% bonus (cijfer≥5)

tentamen studiepunten

3 uur, twintig opgaven

herkansing (voorjaar)

From Wikipedia, the free encyclopedia 30/8/20

discrete wiskunde

… the study of mathematical structures that are fundamentally discrete rather than continuous. In contrast to real numbers that have the property of varying "smoothly", the objects studied in discrete mathematics - such as integers, graphs, and statements in logic - do not vary smoothly in this way, but have distinct, separated values.

Concepts and notations from discrete mathematics are useful in studying and describing objects and problems in branches of computer science, such as computer algorithms, programming languages, cryptography, automated theorem proving, and software development.

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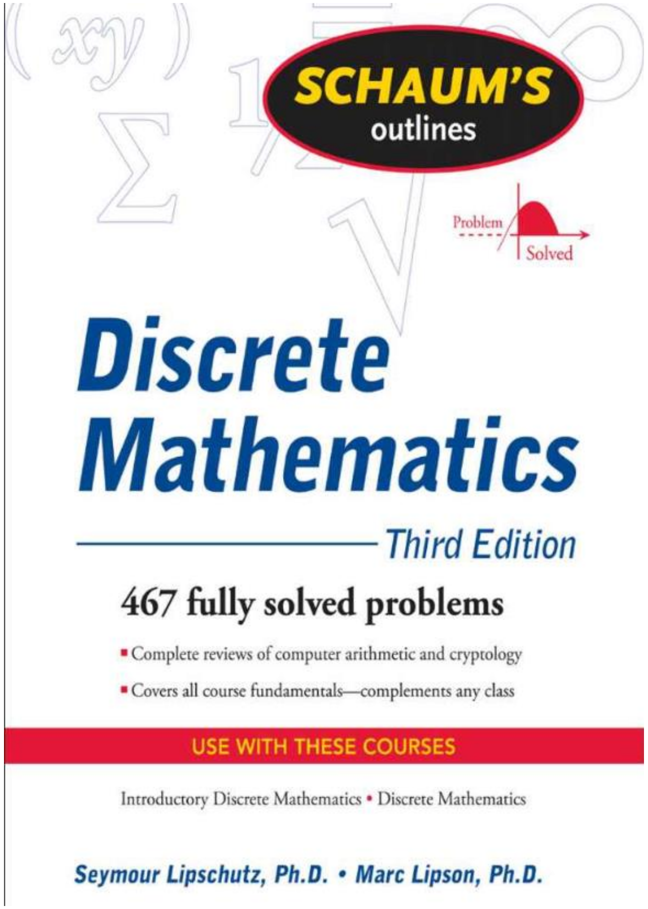
literatuur

Schaum's Outline of
Discrete Mathematics
(*third* edition)
S.Lipschutz & M.Lipson
ISBN 978-0-07161586-0
McGraw-Hill



SCHAUM'S outlines

Problem Solved

Discrete Mathematics

Third Edition

467 fully solved problems

- Complete reviews of computer arithmetic and cryptology
- Covers all course fundamentals—complements any class

USE WITH THESE COURSES

Introductory Discrete Mathematics • Discrete Mathematics

Seymour Lipschutz, Ph.D. • Marc Lipson, Ph.D.

inhoudsopgave

verzamelingen	ch. 1	Set Theory
relaties	ch. 2	Relations
functies	ch. 3	Functions
recursie & inductie#		
grafen	ch. 8	Graph Theory
	9	Directed Graphs
bomen	ch.10	Binary Trees
	8.8	Tree Graphs
	9.4	Rooted Trees
equivalenties#	ch.2.8	Equivalence Relations
	3.4	Modular Arithmetic
	3.7	Cardinality
talen & automaten#		
	ch.12	Languages, Automata

dictaat

niet-inhoudsopgave

	Algorithms,
ch.4	Logic,
ch.7	Probability,
ch.13	Turing Machines,
ch.14	Lattices,
ch.15	Boolean Algebra

inhoudsopgave

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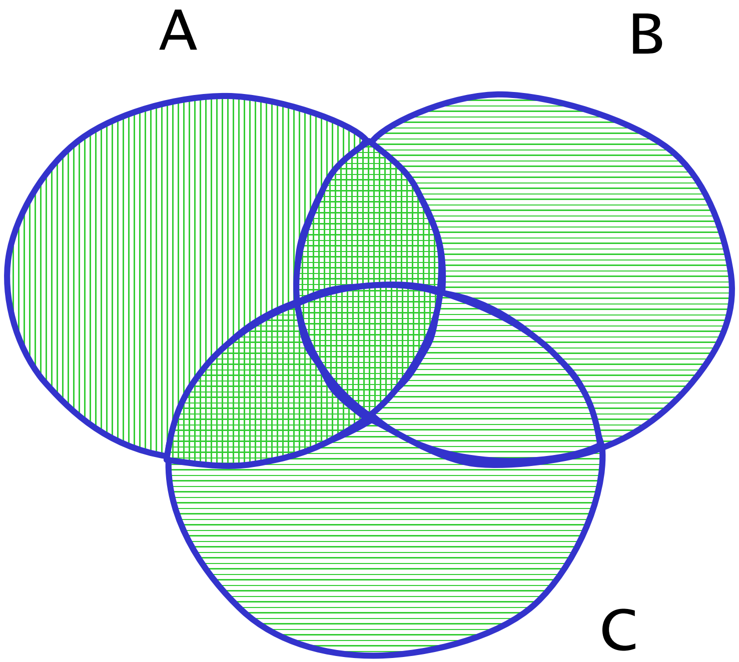
talen & automaten		
	ch.12	Languages, Automata

verzamelingen

Venn diagram



$A \cap (B \cup C)$

▥ ▤

‘algebra’

$A \cap A =$

(nul)

$(A \cap A) \cup \varnothing =$

(complement)

$(A \cap A) \cup (A \cap A^c) =$

(distributief)

$A \cap (A \cup A^c) =$

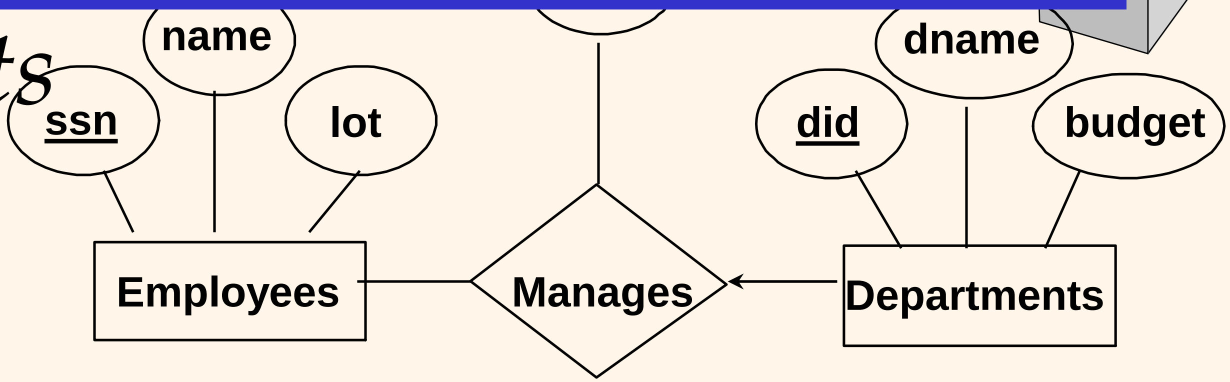
(complement)

$A \cap U =$

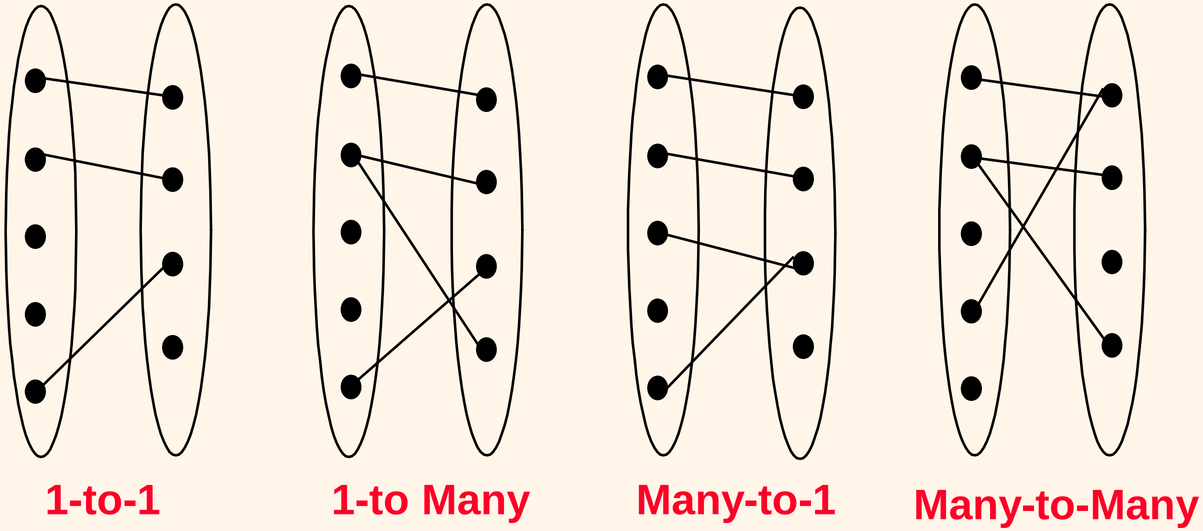
(één)

A

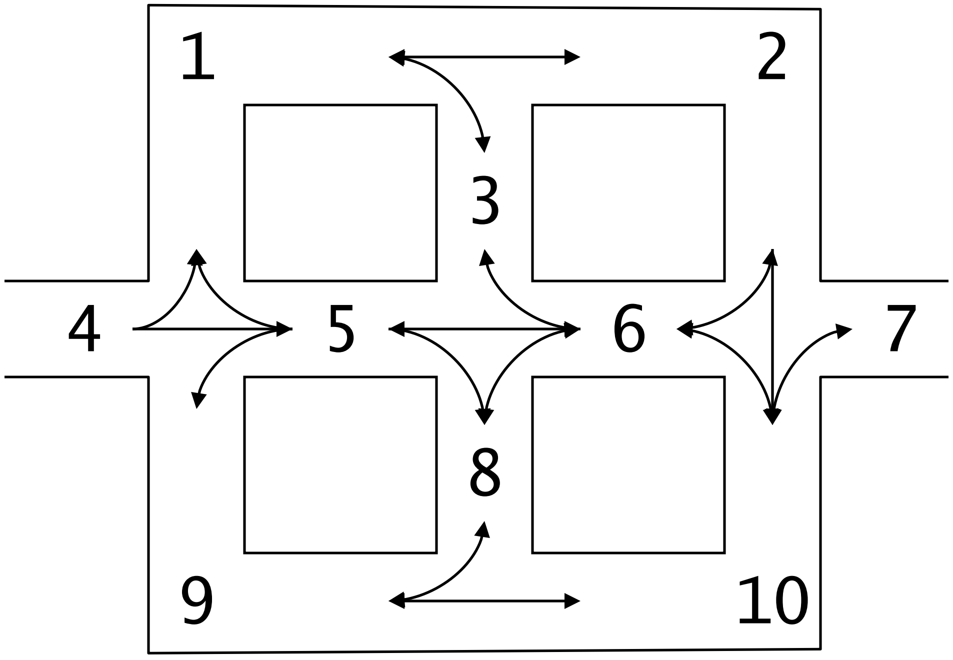
Key Constraints

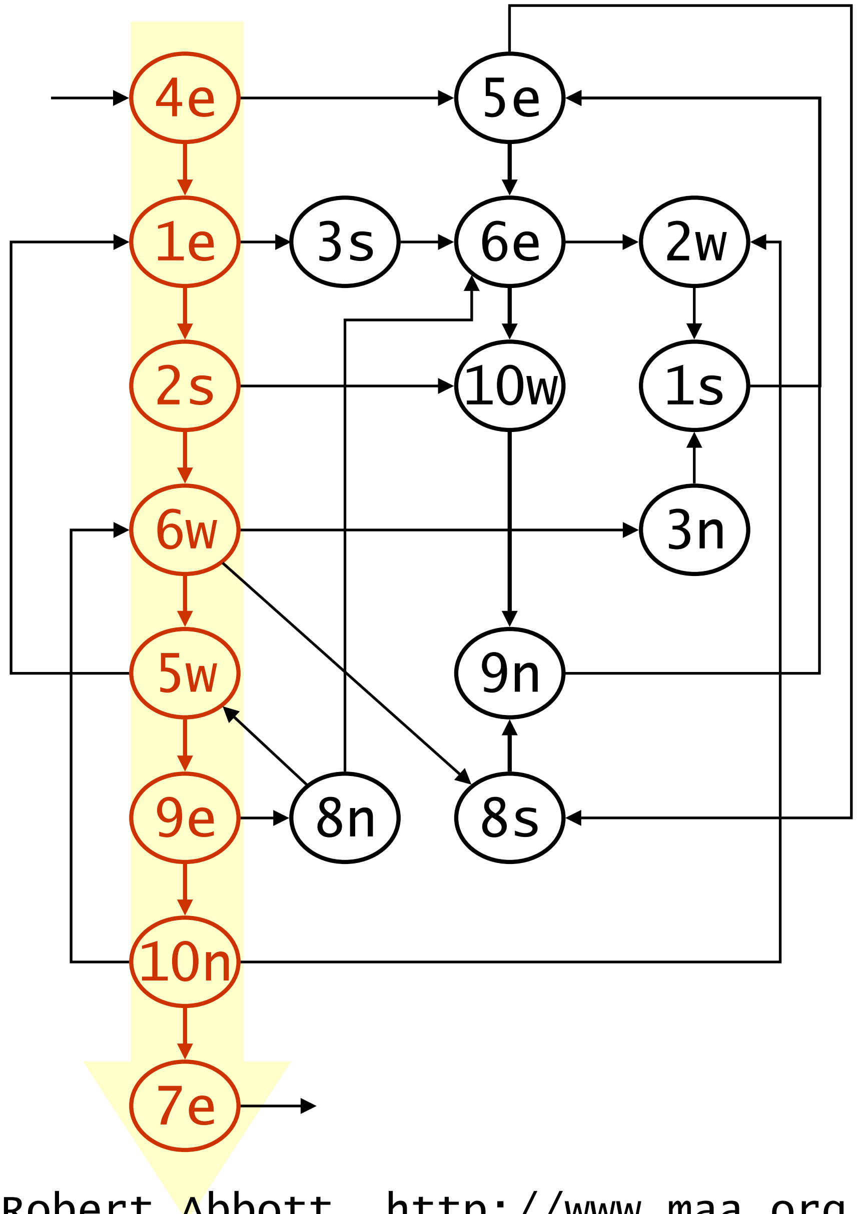


- Consider Works_In: An employee can work in many departments; a dept can have many employees.
- In contrast, each dept has at most one manager, according to the *key constraint* on Manages.



grafen

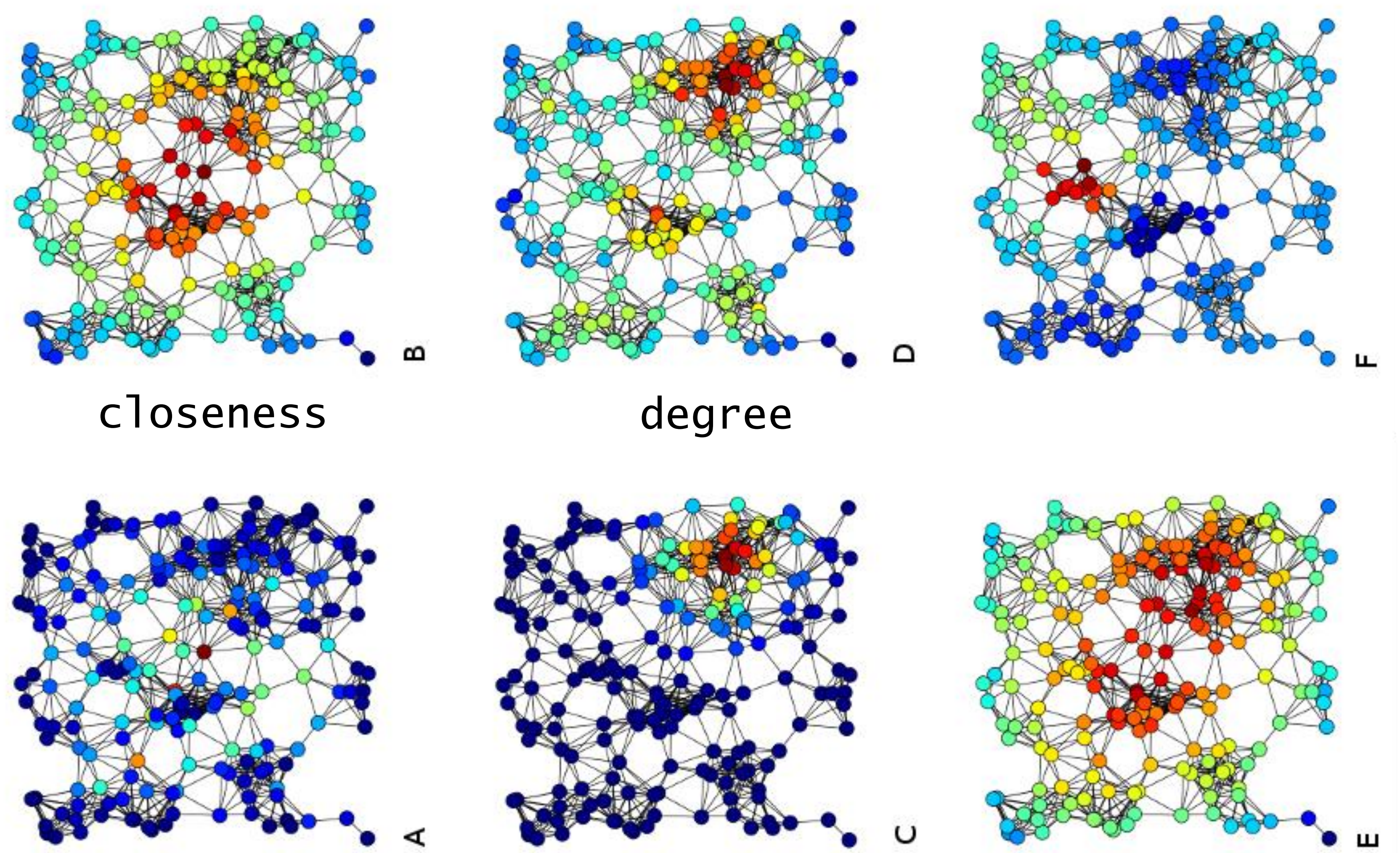




algoritmiek: state chart

Farmer Goes to Market maze. By Robert Abbott. http://www.maa.org

graph centrality



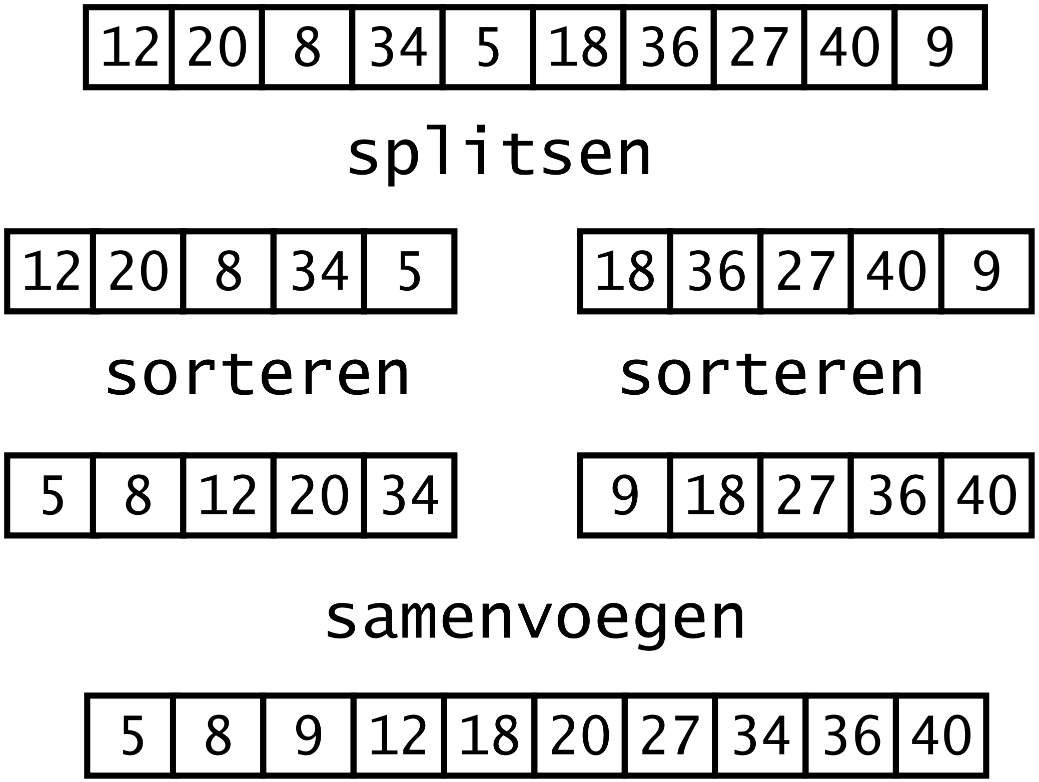
closeness

degree

betweenness

https://en.wikipedia.org/wiki/Centrality

sorteren



12	20	8	34	5	18	36	27	40	9

splitsen

12	20	8	34	5

18	36	27	40	9

sorteren

sorteren

5	8	12	20	34

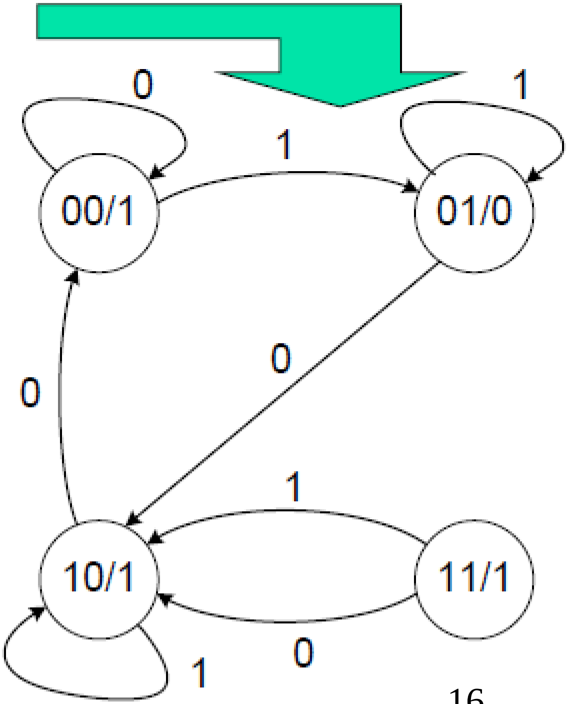
9	18	27	36	40

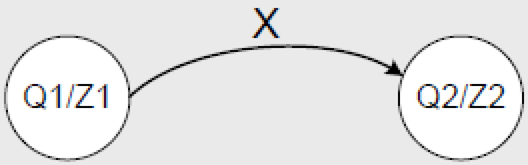
samenvoegen

5	8	9	12	18	20	27	34	36	40

Inputs	Present State		Next State		Outputs
x(t)	$q_1(t)$	$q_2(t)$	$q_1(t+1)$	$q_2(t+1)$	z(t)
0	0	0	0	0	1
0	0	1	1	0	0
0	1	0	0	0	1
0	1	1	1	0	1
1	0	0	0	1	1
1	0	1	0	1	0
1	1	0	1	0	1
1	1	1	1	0	1

- Possible states = { 00, 01, 10, 11 }
  → 4 nodes in the diagram
- Possible Transitions = #rows in table
  → 8 edges in the diagram





Reads as:
When at state ***Q1*** with output ***Z1*** and apply input ***X***, we proceed to state ***Q2*** with output ***Z2.***

(fin)

discrete wiskunde "taal“

terminologie, concepten,
redeneren, formuleren

succes!