

MM524 / DM527: Weekly Notes 2010

Welcome to MM524: Mathematical Tools / DM527: Mathematical Tools for Computer Science! Here are some useful informations concerning the course.

Teachers

The course will be taught by Daniel Merkle. Instructors (TAs) for the course will be

- Tikva Kathja Bøgh Fuglø, tifug09@student.sdu.dk
- Christian Kudahl, kudahl@gmail.com
- Magnus Find, magnus@gausdalfind.dk

Textbook

Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 6th edition, McGraw-Hill, Inc., 2006.

The book can be bought at the “Studenterboghandelen” for 525 kr.

Note that answers to the odd-numbered exercises can be found at the end of the book. In addition, some concepts used in the exercises are defined between exercises, so when a problem uses a concept or notation not defined in the text, you should look to see if it is defined a bit before the problem is stated.

Format

The lectures will be in English. There will be assignments related to each lecture. These assignments are not obligatory, but you should be prepared to discuss them in the discussion section (eksaminatorier). There will usually be more problems assigned than there is time to discuss them; the extra problems will give you extra training.

It is strongly recommended that you (try to) solve most of the exercises by yourself in order to get the necessary training for passing the written exam!

The weekly notes and other information about the course are available through

<http://www.imada.sdu.dk/~daniel/MM524-DM527-2010/>

Please do not hesitate to contact Kathja, Christian, Magnus, or Daniel if you have questions concerning the course.

Schedule

Lectures will be on Tuesday and Thursday. The detailed schedule also for the discussion sections can be found online.

Homework assignments

In order to guarantee that you continuously work with the topics of the course there will be homework assignments which you have to solve. There will be three such assignments; they will be corrected by the TAs. These assignments count for 30% of the final grade.

The assignments are part of the exam and have to be solved individually. Solutions to assignments must not be copied from other people's work in full or in part. Working together will be treated as exam cheating. Please refer to http://www.sdu.dk/Information_til/Studerende_ved_SDU/Eksamen/snyd for more detailed rules of academic integrity.

The assignment are valid until the reexamination after 2nd quarter and cannot be carried through to the following year.

You have to turn in your assignments via Blackboard. Note that in the upper left hand corner of the blackboard webpage for this course, there is an icon which you can click on to expand the menu for the course. It is just to the left of the code for and name of the course. For handing in as assignment click on the menu entry "Tools", and then choose "Assignment hand in". Blackboard will send you a receipt via email. Note that you will not be able to turn in an assignment late.

Exam

The course will be evaluated on the basis of a final 3 hour written examination (26. Oktober 2010) and continuous assignment throughout the course. The written exam counts for 70% of the final grade, the mandatory assignments count for 30% of the final grade.

The mandatory assignments are valid until the reexamination after 2nd quarter and cannot be carried through to the following year.

Re-examination is after 2nd quarter (12. Januar 2011).

Lectures in week 36

Tuesday 07/09

- Introduction to the course
- Section 1.1 : Propositional Logic
- Section 1.2 : Propositional Equivalences
- Section 1.3 : Predicates and Quantifiers

Thursday 09/09

- Section 1.3 : Predicates and Quantifiers
- Section 1.4 : Nested Quantifiers
- Section 1.5 : Rules of Inference

Exercises for discussion sections

S7: Wednesday 08.09. M1: Wednesday 08.09. S1: Friday 10.09.

1. Section 1.1

Exercise 1, 3, 5, 9, 17, 19, 25, 27, 37a, 37b, 45, 46, 55-59, 61, 63

2. Section 1.2

Exercise 7, 15

S7: Friday 10.09. M1: Friday 10.09. S1: Monday 13.09.

1. Section 1.2

Exercise 17, 42, 43, 49, 50, 60a

2. Section 1.3

Exercise 12a, 12d, 12e, 50, 53, 54, 59

3. Section 1.4

Exercise 9, 31d, 39

4. In the questions (a)-(g) below write the statement in the form "If ..., then ..."
- (a) x is even only if y is odd.
 - (b) A implies B .
 - (c) It is hot whenever it is sunny.
 - (d) To get a good grade it is necessary that you study.
 - (e) Studying is sufficient for passing.
 - (f) The team wins if the quarterback can pass.
 - (g) You need to be registered in order to check out library books.
 - (h) Write the contrapositive, converse, and inverse of the following: If you try hard, then you will win.
 - (i) Write the contrapositive, converse, and inverse of the following: You sleep late if it is Saturday.

1st Mandatory Homework Assignment

The solutions must be handed in via Blackboard latest on

Friday, September 17, 13:00.

Solutions to the problems given below need to be submitted as **one PDF file** (please ask your TA in case you do not know how to create a PDF file). Other formats are not accepted. The front page of a solution file should clearly specify

- your name,
- your discussion section name (M1, S1, or S7),
- a date and a time of when the PDF was created (such that the latest versions can be determined in case of resubmissions)

Problem 1

Solve from Section 1.3 exercises 60 (a)-(c).

Problem 2:

Solve from Section 1.4 exercises 26 (a)-(h).

Problem 3:

Find **all** possible counterexamples to the universally quantified statements, where the domain for all variables consists of all real numbers.

a) $\forall x(x^2 = x)$

b) $\forall x(x^2 \neq 2)$

c) $\forall x(|x| > 0)$

Problem 4

Solve from Section 1.4 exercise 32(d).