

CS1303 Final Exam Notes Winter 2021

open book
& at home

CS*1303 FR01B Discrete Structures Lu April 17, 2021 09:00AM 112

About the final exam

Coverage:

All Lecture Notes + All Tutorials

All Questions in Assignments 1- 6

All Questions in Midterm, Quiz1 and Quiz 2

Main points of knowledge you need to master for the final-term exam:

1. You need to know variables, the language of sets in this course.
2. You need to know logical form and logical equivalence.
3. You need to know conditional statements.
4. You need to know valid and invalid arguments.
5. You need to know predicate and quantified statements.
6. You need to know statements containing multiple quantifiers.
7. You need to know arguments with quantified statements.
8. You need to know direct proof and counterexamples.
9. You need to know proof by division into cases.
10. You need to know indirect arguments, including contradiction and contraposition.
11. You need to know sequences.
12. You need to know mathematical regular induction.
13. You need to know mathematical strong induction.
14. You need to know the properties of sets.
15. You need to know the element method of proof in sets.

Notes:

1. For the above main points, "know" means "master".
2. All main points listed above are covered by lecture notes and tutorials.
3. **Pay attention to all questions in tutorials and assignments.**
4. Good luck!

About the final exam

1. Our final exam is **open-book**, you can have any materials at hand, but cannot discuss with other students.
2. I will zip the final exam paper with a strong password, and upload on D2L (in the directory Final Exam Paper) in the early morning of April. 17, 2021, so that all students can download it on their own computers, but cannot open it.
3. Around 8:50 am, April, 17, 2021, I will send an email to all CS2383 students about the password to unzip the final exam paper.
4. Each student prepare some clear papers, and can write down his/her final exam on these clean papers between 9:00 pm –12:00 pm.

5. From 12:00 pm -12:15 pm, each student need to take photos on all his/her papers (do not miss any page) , zip them (or convert them into one pdf) and upload them to the final exam directory on D2L (Final Exam Time Date (9:00 am - 12:00 pm 180 minutes) April 17, 2021).
6. I will check the uploading time, if the uploading time is after 12:15 pm but before 12:30 pm, 10 marks penalty will be applied. If the uploading time is after 12:30 pm, 50 marks penalty will be applied. If no submission, I will consider the final exam is 0 mark.
7. Of course, I will consider some special cases, only if some students discuss with me about their cases early. I will record their cases in a formal report and take some actions case by case for those students.
9. Each student needs to have a smartphone, or iPad in hand so that he/she can take photos on his/her paper for submission.

University of New Brunswick
Faculty of Computer Science
CS1303 Discrete Structures - Final Exam
April 17th, 2021;
Time Allowed: 180 minutes

Student Name: _____ Student No.: _____

Instructions

This paper contains 6 questions, and comprises 4 pages.
Answer ALL questions. This is an open-book examination.
The marking scheme is shown in the left margin and [100] constitutes full marks.
The following table may be needed for taking this examination.

Given any statement variables $p, q,$ and $r,$ a tautology \mathbf{t} and a contradiction $\mathbf{c},$ the following logical equivalences hold.

1. <i>Commutative laws:</i>	$p \wedge q \equiv q \wedge p$	$p \vee q \equiv q \vee p$
2. <i>Associative laws:</i>	$(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$	$(p \vee q) \vee r \equiv p \vee (q \vee r)$
3. <i>Distributive laws:</i>	$p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$	$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$
4. <i>Identity laws:</i>	$p \wedge \mathbf{t} \equiv p$	$p \vee \mathbf{c} \equiv p$
5. <i>Negation laws:</i>	$p \vee \sim p \equiv \mathbf{t}$	$p \wedge \sim p \equiv \mathbf{c}$
6. <i>Double negative law:</i>	$\sim(\sim p) \equiv p$	
7. <i>Idempotent laws:</i>	$p \wedge p \equiv p$	$p \vee p \equiv p$
8. <i>Universal bound laws:</i>	$p \vee \mathbf{t} \equiv \mathbf{t}$	$p \wedge \mathbf{c} \equiv \mathbf{c}$
9. <i>De Morgan's laws:</i>	$\sim(p \wedge q) \equiv \sim p \vee \sim q$	$\sim(p \vee q) \equiv \sim p \wedge \sim q$
10. <i>Absorption laws:</i>	$p \vee (p \wedge q) \equiv p$	$p \wedge (p \vee q) \equiv p$
11. <i>Negations of \mathbf{t} and \mathbf{c}:</i>	$\sim \mathbf{t} \equiv \mathbf{c}$	$\sim \mathbf{c} \equiv \mathbf{t}$

In addition, Representation of If-Then as Or (Implication Equivalence) means $p \rightarrow q \equiv \sim p \vee q,$ which may also be used.

- [48] 1. **Multiple choice questions:** read each question carefully and choose the correct answer: A, B, C or D. Make sure you only choose one answer for each question.
- [10] 2.
- [10] 3.
- [15] 4.
- [10] 5.
- [7] 6. *Good luck!*

