Homework #1
Posted: 01-31-2017
Due: 02-07-2016

Student’s first and last name: ____________________________
Grade (grader only): _____
Student’s UID: ____________________________
Student’s Section: ____________________________

University Honor Pledge:

I pledge on my honor that I have not given or received
any unauthorized assistance on this assignment/examination.

Print the text of the University Honor Pledge below:

________________________________________________________
________________________________________________________
________________________________________________________

Signature: ____________________________

Problem (0): READINGS (0 pts)

To successfully complete this homework, you will need to read the textbook chapter on The Logic of Compound Sentences (Chapter 2 in Edition 4, might be different in other editions) Find in the List of Symbols $\mathbb{N}$, $\mathbb{Q}$, $\mathbb{Z}$, $\mathbb{R}$. Make sure you know what they mean. You should also read up on base 2 representations of integers, either from the book (Chapter “Logic” and, in particular, the subchapter on circuits) or from any other source you like.
Problem (1): Truth Tables (30 pts)

Consider the following two Boolean Formulas

FORMULA ONE:

\[ x_1 \land (\sim x_1 \lor x_2) \land (\sim x_2 \lor x_3) \land \cdots \land (\sim x_{99} \lor x_{100}) \]

FORMULA TWO:

\[ x_1 \land (\sim x_1 \lor x_2) \land (\sim x_2 \lor x_3) \land \cdots \land (\sim x_{99} \lor x_{100}) \land \sim x_{100} \]

(i) If you were to write a truth table for FORMULA ONE (DO NOT DO THIS!) how many rows would it have? Why?

(ii) If you were to write a truth table for FORMULA ONE how many rows evaluate to TRUE? Why?

(iii) If you were to write a truth table for FORMULA TWO how many rows evaluate to TRUE? Why?

Problem (2): Truth Table’s (10 pts)

Do a truth table for the formula \((p \lor q) \land \sim r\).

Problem (3): Notation for Sets of Numbers (10 pts)

Each of the following symbols is a standard notation for a set of numbers. For each one say what set of numbers it is a symbol for, give an example of a number IN that set, and give an example of a number NOT IN that set.

1. \(\mathbb{N}\)
2. \(\mathbb{Q}\)
3. \(\mathbb{Z}\)
4. \(\mathbb{R}\)

Problem (4): Base 2 (10 pts)

a) Write the base 10 number 123 in base 2.

b) Write the base 2 number 1101 in base 10.

Problem (5): Course Data (15 pts)

To complete this problem, you will need to log into our website and read the first few parts of our syllabus.

Question (a): Fill-in-the-blank(s) (1 pt per gap for 10 pts total)

Fill in the blanks in sentences (i) - (vi). Note that by “tutor” we refer to what the department has traditionally be calling a “teaching TA”.

(i) Your course section is ________ and your assigned discussion session tutor is __________________ ______.

(ii) Your section’s discussion sessions meet Monday & Wednesday at ________ in CSIC ________, and your Tuesday / Thursday lectures occur at ________ in CSIC ________.

(iii) There will be ___ “Major Scheduled Grading Events” this semester. (Fill in this blank with a positive integer number.)

(iv) The Final exam is worth _____ % of your final grade.

(v) The full name of the author of our required textbook is: __________________________
(vi) The first exam for the course is scheduled on _________________. (Fill in this blank with a date in any common format.)

Question (b): True / False (1 pts each for 5 pts total)

Answer questions (i)-(v) by writing T or F in the small horizontal space (____) to their right, if you believe them to be true or false respectively. You do not need to justify your answers.

(i) On Monday, 02-06, there will be a scheduled discussion session. ____

(ii) On Wednesday, 03-22, there will be a scheduled discussion session. ____

(iii) Dr. Gasarch’s office is AVW3258 ___

(iv) If you want to be a CS major in UMD, you have to pass 250. ___

(v) Chronologically speaking, the 4th module for our course is Set Theory. ___
Problem (6): Syllabus (25 pts)

Answering the following questions requires a thorough reading of our syllabus. This includes the campus-wide so-called “Course-Related Policies” to which we link from our page.

Question (a): True / False (1 pts each for 10 pts total)
Answer questions (i) - (x) with T or F in the small horizontal space (___) to their right, if you believe them to be true or false respectively. You do not need to justify your answers.

(i) According to document V-100(B), the University of Maryland Code of Student Conduct, people who audit a course are not required to abide by its regulations. ___
(ii) UMD’s Code of Academic Integrity defines plagiarism as “...intentionally or knowingly representing the words or ideas of another as one’s own in any academic course or exercise.” ___
(iii) According to document VI-1.60(A), the University of Maryland Sexual Misconduct Policy & Procedures, the University aims to resolve any complaints of sexual misconduct within one calendar month from the date when they were first reported. ___
(iv) It’s the University’s obligation to accommodate every disability. ___
(v) Qualifying individuals can provide a DSS accommodation letter to the instructor up to one calendar month after classes begin. ___
(vi) Mid-Term (“Early Warning”) Grades are not reflected on your transcript. ___
(vii) You can make as many copies of the original or edited lecture slides, so long as all copies are made for your own personal use. ___
(viii) As a UMD student, you are required to submit course evaluations for our course. ___
(ix) If an absence is excused, it is the course staff’s obligation to provide academic accommodations. ___
(x) A student can “self-document” a medically necessitated absence (i.e provide documentation that they themselves have signed) only once this semester, as long as the absence does not co-incide with an examination. ___

Question (b): Multiple Choice (2 pts each for 10 pts total)
For questions (i) - (v), select the correct response between (a), (b), (c) or (d). There is exactly one correct response for every question.

(i) The “Schedule Adjustment” period refers to the first ___ days of classes.
   (a) 20
   (b) 10
   (c) 5
   (d) 30

(ii) Select the event that is, according to the University’s “Course-Related policies”, a typical example of an event that may lead to an excused absence, if verified through appropriate documentation.
   (a) “Rear-ended” while driving to class.
   (b) Being hungover.
   (c) Jury duty.
   (d) Campus parking lot assignment change.

(iii) If we offer a total of 15 homeworks (and provided that we don’t change the grading policy as dictated on the syllabus), what will those homeworks’ total percentage of their grade be?
(a) 15%
(b) 20%
(c) 10%
(d) Something else

(iv) Which among the following course codes corresponds to a UMD course that is not a prerequisite for 250?

(a) CMSC 131
(b) CMSC 132
(c) MATH 141

(v) According to the guidelines set forth by the University’s “Course-Related policies”, which subject line among the following is the best to use when contacting the instructor through e-mail or ELMS mail?

(a) “Need to be excused from tomorrow’s discussion”
(b) “CMSC250 student: Meet today after class?”
(c) “CMSC250 student: Request for meeting to review midterm grade”
(d) “URGENT! Cannot sit for next week’s midterm!”

Question (c): Free Text (5 pts)

Juan, an avid follower of the Church of the Flying Spaghetti Monster, wants to be excused from the discussion section of Monday 02-06 because of the annual “Spaghetti and Meatballs” festivities in his local community. What are the steps that he needs to make in order to ensure that his absence from that particular discussion section is excused?

Problem (7): AND in the real world VS AND in Mathematics (0 pts)

(This is NOT to be handed in. This is for your own enlightenment.)

Bill Gates IS famous. Bill Gates IS a bridge player. Hence: $\text{Bill Gates is a famous bridge player.}$

That does not seem right.

1. What is the problem with the reasoning?

2. Give other examples where this kind of reasoning would lead to the wrong conclusion.

Problem (8): HONORS PROBLEM (0 pts)

(This is NOT to be handed in. This is for your own enlightenment.)

Throughout the course we will ask HONORS PROBLEMS which are not to be handed in. We recommend that you talk about them with your friends (or with your enemies, or with your frenemies). You are encouraged to talk to Dr. Gasarch about them in groups with your friends. This WILL NOT count towards the course grade, this is JUST for your enlightenment.

A Truth Teller always tells the truth. A Normal might tell the truth or might lie. You can only ask people a YES-NO question (also called a boolean question).

1. Let $1 \leq t \leq 100$. You are in a room with 1 Normal and $t$ Truth Tellers. For which $t$ can you determine, with a finite number of questions, who the normal is? For those $t$ try to find the minimum number of questions to ask.

2. Let $1 \leq t \leq 100$. You are in a room with 2 Normal and $t$ Truth Tellers. For which $t$ can you determine, with a finite number of questions, who the normals are? For those $t$ try to find the minimum number of questions to ask.

3. Generalize to $n$ normals and $t$ truth tellers.