**CSC 379 Homework 1**

**UM-Flint, Winter 2019**

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**Due Date:** Tuesday, 1/17/2019, 11:59 PM EST. Late assignments not accepted without an approved excuse.

**Submission Format:** Submit typed as a pdf file. Use the Attach File option through Blackboard, on this assignment.

**I will not accept hand-written assignments.**  PDF submissions **may not include images of typed text**. Any text which is contained within an image file **will not be graded**. Yes, I can tell the difference. You may use image files for any diagrams you need to draw, however.

**Scoring:**

Maximum Points Possible: 100

**Group Member Rules:** You may have **unlimited** partners at no cost**.**

Each person must submit his or her own copy of the assignment to receive credit. You are not required to have a partner. You can freely chat on the discord server about questions and solutions. If someone (other than the instructor) is particularly helpful to you, please cite them on your assignment.

However, and this is important: **Please do not simply give solutions away.** The reason is that if someone does not understand the solutions, does not practice on their own, etc. this means they will A) not develop a mastery of the material and B) **probably not do well on the exams.**   
  
This is an experiment. I want to see how it goes letting you work together more freely. You are adults and I want to try to treat you as such. So, to that end, on this assignment I will trust that you will endeavor to understand things rather than just get quick solutions without understanding them etc. If the exams show a lower level of understanding on this part of the material I will probably go back to fewer partners. Impress me with how you handle the freedom!

**General Homework Rules:**

**You may NOT use outside sources to obtain solutions to homework problems. You may NOT look for answers on the Internet.**You may read outside sources to help you understand the general material we are covering in the course, but you may not use outside sources to solve the homework problems. "Outside sources" includes other students who are not members of your group. You may talk to other members of the class about the course content, but you may not use other students' solutions to the homework unless they are a member of your group. Similarly, you may not provide solutions to other students unless they are a member of your group. You may not have a member of your group who is not a member of your sections of the course this semester. If you have any doubts about what is allowed, ask your professor.

I will not adjust your grade on an exam or assignment based upon good performance on other homeworks, good performance in other classes, or other factors such as “needing an A.”

**Advice:**

Remember that you are responsible for everything you turn in with your name on it. Use your best judgment on who to work with if you have a partner. If your partner plagiarizes, you have also plagiarized. If there are any issues, please inform me.

Do not try to avoid doing the homework. The minimum penalty for plagiarism is a 0 on the assignment. If plagiarism occurs, and I do not catch it, you can be certain that it will show up in your score on the exams.  Please do not risk it.  You should know at this point that not doing the assignments will result in your being unable to score well on your exams.

Please listen to me on this.  I want you to do well in the course.   Homework is designed to help you achieve the level of mastery needed. Please put the time in on the assignments and you will do better. Please come to office hours, email me, start early, and get help from me if you have trouble.

Helpful shortcuts for the equation mode in Word:

\Theta (Big Theta) produces: \O (Big Oh) produces: \Omega (Big Omega) produces:   
\o (little oh) produces: \omega (little omega) produces: n^a (exponent) produces:

n\_a (subindex) produces:   
log\_a b (log) produces:   
a/b (fraction) produces:   
\sum (summation) produces:

\cup (union) produces:

\cap (intersection) produces:

Combine with ()’s to get more complex terms. Examples:

n^(log\_(b-1)a^b) produces: ☺

n^log\_b-1 a^b produces: ☹☹

(n-1)/(n^2+2) produces: ☺

n-1/n^2+2 produces: ☹☹

Some logarithmic properties for b>1, a>0, c>0, where a and c are both real numbers. (There are more in the textbook, as you have seen).

Please see Appendix C for more information on Probabilities, Expected Value, Expected Value of Random Variables, Counting, Combinations, etc.

Please see Appendix A for more information on Summations / Geometric series, etc.

**Show your work for calculations you perform.**

**Special for calculating summation solutions:** Once you have determined the appropriate summation, you are free to either calculate its solution or to reference a solution. You may reference a book, an online source such as Wikipedia, or to use Wolfram Alpha or some other calculator for this part only. You must cite your source. This is only for **solving** summations, **not** for determining what the summations should be! I would like you to be able to solve summations, but that is not what I am trying to evaluate here.

**Example**: If you found a complexity to be:

Then you could say:

Citing Introduction to Algorithms (Cormen et. al), page 1147, A.5, we have that:

Therefore:

**Homework problems are on the following pages.**

Problem 1) (60 points) (Asymptotic Bounds)

Provide the precise asymptotic bound of each of the following equations. Remember to consider the limit as n approaches infinity. **Be mindful of the constants and the variables.**

**Functions with multiple variables should consider all variables when determining asymptotic bounds.**

**1.A)**

**1.B)**

**1.C)**

**1.D)**

**1.E)**

**1.F)**

**1.G)**

**1.H)**

**1.I)**

**1.J)**

**1.K)**

**1.L)**

Problem 2) (40 points) (Asymptotic bounds)

In column 1 a set of premises are provided. In column 2 a conclusion is provided. Each conclusion is true.

Use the relational properties and the definitions of to prove each conclusion is true by logical implication.

Complete your proof with a symbol, as I have done in the examples here:

**Examples:**

|  |  |  |
| --- | --- | --- |
| Premises: | Conclusion: | Proof: |
|  |  | By definition of ,  Implies that |
|  |  | By Transpose Symmetry,  implies that  By Transitivity,  Implies that |

**Your problems:**

|  |  |  |
| --- | --- | --- |
| Premises: | Conclusion: | Proof: |
|  |  | By definition of ,  Implies that |
|  |  | By Transitivity,  )  )  Implies that  By Transpose Symmetry,  Implies that |
|  |  | By definition of  Implies that  By Transitivity,  Implies that  By definition of  Implies that |
|  |  | By Transpose Symmetry,  Implies that  By Transitivity,  )  Implies that |