Assignment 9  
Computer Science 235

Reading.  Sections 7.1, 7.2, 7.3, and 7.4

1) Answer each part TRUE or FALSE.
   a) \(2n = O(n)\)
   b) \(n^2 = O(n)\)
   c) \(n \log^2 n = O(n^2)\)
   d) \(\sqrt{n} = O(\log n)\)
   e) \(3^n = 2^{O(n)}\)
   f) \(2^{2n} = O(2^{3n})\)

2) Answer each part TRUE or FALSE.
   a) \(n = o(2n)\)
   b) \(2n = o(n^2)\)
   c) \(3^n = o(2^n)\)
   d) \(n = o(1)\)
   e) \(n = o(\log n)\)
   f) \(1 = o(1/n)\)

3) Show that \(P\) is closed under union, concatenation, and complement.

4) Show that \(NP\) is closed under union and concatenation.

5) Part 3 (of 3). This is the final part for our project exploring papers in the field of Theory of Computation. Write a 1-2-page reflection paper on the ways in which the assignment has helped you engage with the content of the course and theoretical Computer Science in general.

Here are some questions to think about as you prepare to write this reflection:

- Has the assignment affected the role you see theory has in our society today? If so, how?
- Has your relationship with theoretical concepts changed throughout the semester? If so, how?
- Are there any topics in the course that you want to now pursue further? Were there topics you were surprised by?
- Think back on your favorite moment while engaging with this paper. What made it memorable?
• What was the most challenging aspect of engaging with this paper? What tools did you use to tackle that challenge?
• What did you learn by talking with your peers about the paper you were reading?

These are only suggestions for possible directions for your reflection; you do not have to answer any one of these questions in particular, and you *do not* have to answer all of them. We encourage you to be both reflective and creative. Take this opportunity to actually reflect on your learning this past semester.

Your reflection should be logically organized and easy for a reader to follow. This is not an academic essay, but you are trying to make a point! You need to have a clear idea that you are pushing across, and you need a coherent argument. This is not a draft, so make sure to use clear language with no grammatical errors.

**Grading**

This assignment is worth 3% of your final grade. You will be graded on the final reflection you submit as part of Assignment 9.