Lecture 39

CSE 331

Dec 7, 2018

HW10 Solutions

At the end of the lecture

Extra Office Hours today

Location might change as there are events today (check piazza)

Quiz 1 review

(a) **(Part 1)** Argue why the following statement is **TRUE**.
If $f(n) = c \cdot g(n)$, then $2^{f(n)} = \left(2^{g(n)}\right)^c$ for every real number c.

Solution 1

$2^{f(n)} = 2^{\,c*g(n)} = (2^{g(n)})^c$

A re-statement of what needs to be proven

Solution 2

For any x, y, $(2^x)^y = 2^{x*y}$

$2^{f(n)} = 2^{\,c*g(n)} = (2^{g(n)})^c$

This argues why the 2nd equality is true

Q1 (a): part 2

(**Part 2**) Is the following statement true or false? Also remember to briefly JUSTIFY your answer.

If $f(n)$ is $\Theta(g(n))$, then $2^{f(n)}$ is $\Theta\left(2^{g(n)}\right)$.

Solution 1

Not EXACTLY the same problem

This was proven in T/F #4

4th T/F poll

Is the following statement **true** or **false**?

If $f(N)$ is $O(g(N))$, then $2^{f(N)}$ is $O\left(2^{g(N)}\right)$.

○ True
○ False

Solution 2

The same counter-example from T/F #4 works since there $f(n) = \theta(g(n))$

When re-using, make sure you add in whatever "extra" is needed

Q 1(b): part 2

(Part 2) Is the following statement true or false? Also remember to briefly JUSTIFY your answer.

The Gale Shapley algorithm (with women proposing) on such inputs runs in $O(n)$ time.

True   **False**   (Please **CIRCLE** your answer)

Solution 1

FALSE In class we saw GS runs in $O(n^2)$ time

Solution 2

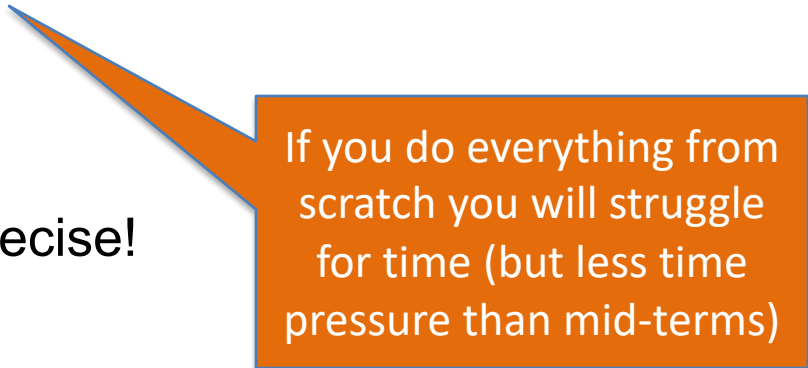TRUE In class we saw GS is a linear time algorithm

The Q is asking about specific inputs and not general inputs

Linear time for GS is $O(n^2)$

Some other reminders

Re-use as much as possible (remember Q2 on mid-term 2!)

Make sure your references are precise!

If you do everything from scratch you will struggle for time (but less time pressure than mid-terms)

Review all HWs, recitation notes, piazza T/F Qs, Quizzes

All this and much more...

Final exam post

I'll start off with some generic comments:

- The final exam will be based on all the material we will see in class up to the P vs NP stuff (we'll most likely finish that stuff by Monday, Dec 3 or in the worst-case by Wednesday, Dec 5).
- The lecture on Friday, Dec 7 will be a Q & A session (where you can ask any 331 related questions)-- stay tuned for more details.
- Exam will be from **8:30 to 11:00am** on Monday, **Dec 10** in class (**Norton 112**). Note that the exam will be for 2.5 hours and *not 3 hours* as it says on HUB.
    - If you have three of more exams scheduled on Dec 10, please contact me **NO later than 5PM on Monday, DECEMBER 3**. *If you contact me after Dec 3, I won't be able to accommodate any re-scheduling request.*

Next are comments related to **preparing for the finals:**

1. Take a look at the sample final (@975) and spend some quality time solving it. Unlike the homeworks, it might be better to try to do this on your own. Unlike the sample mid-term, this one is an actual 331 final exam so in addition to the format, you can also gauge how hard the final exam is going to be (your final exam will be the same ballpark). However as with the sample mid-term, you make deductions about the coverage of topics at your own peril (but see points below). Once you have spent time on it on your own, take a look at the sample final solutions (@975).
2. We will have some extra OHs on Friday, Dec 7 (@1038).
3. Attend the Q&A session (Friday, Dec 7) in class.
4. The actual final will have the same format as the sample final: The first question will be T/F, 2nd will be T/F with justification, the rest of the three will be longer questions and will ask you to design algorithms (parts of them might be just analyzing an

Remember to bring your UB card

Questions?