NAME: _____

CSE 331 Algorithms and Complexity Final Exam: Spring 2021

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DIRECTIONS:

- Closed Book, Closed Notes except for two $8\frac{1}{2}$ " × 11" review sheet.
- Time Limit: 3 hours (2.5 hours for the exam, 30 mins for the upload process).
- Each problem starts on a new page.
- Problem 6 is a bonus problem.
- Keep your desk clear of everything else other than the exam paper, review sheets and writing implements.
- Make sure you clearly write the question number for each solution.
- Upload your solutions to AutoLab (Final) as a single pdf file (at most 50MBs, in a good resolution that is displayed properly in AutoLab).

1	/15
2	/24
3	/25
4	/20
5	/16
6	/2
Total	/100
Bonus	/2

FEW GENTLE REMINDERS/SUGGESTIONS:

- You can quote any result that we covered in class (lecture, recitation or piazza) or any problem that was there in a homework (but remember to explicitly state where you are quoting a result from).
- If the question does not specifically ask for a formal proof (or algorithm details), just a correct proof idea (or algorithm idea resp.) should fetch you at least 80% of the points.
- If you get stuck on some problem for a long time, move on to the next one.
- The ordering of the problems is somewhat related to their relative difficulty. However, the order might be different for you!

- You should be better off by **first reading all questions** and answering them in the order of what you think is the easiest to the hardest problem. Keep the points distribution in mind when deciding how much time to spend on each problem.
- Spend time on the bonus problem only if you are done with the rest of the exam.
- Finally, relax and enjoy the exam! (Think of a time when you'll be done with 331!)

- 1. $(5 \times 3 = 15 \text{ points})$ Answer True or False to the following questions (by circling your answer). **No justification** is required. (Recall that a statement is true only if it is logically true in all cases while it is false if it is not true in some case).
 - (a) **True False** (Please **CIRCLE** your answer)
 - (b) **True False** (Please **CIRCLE** your answer)
 - (c) **True False** (Please **CIRCLE** your answer)
 - (d) True False (Please CIRCLE your answer)
 - (e) **True False** (Please **CIRCLE** your answer)

- 2. $(4 \times (2 + 4) = 24 \text{ points})$ Each of the questions below has two parts. For the first part, you need to give a justification for the statement and is worth 2 points. For the second part, answer True or False and briefly JUSTIFY your answer. A correct answer with no or totally incorrect justification will get you 1 out of the total 4 points. An incorrect answer *irrespective* of the justification will get you 0 out of 4 points. You *can* assume part 1 when answering part 2 but to get credit for part 1, you *have* to answer part 1. (Recall that a statement is true only if it is logically true in all cases while it is false if it is not true in some case).
 - (a) (Part 1) Argue why the following statement is TRUE.

(Part 2) Is the following statement true or false? Briefly JUSTIFY your answer.

True False (Please CIRCLE your answer)

(b) (Part 1) Argue why the following statement is TRUE.

(Part 2) Is the following statement true or false? Briefly JUSTIFY your answer.

True False (Please CIRCLE your answer)

(c) (Part 1) Argue why the following statement is TRUE.

(Part 2) Is the following statement true or false? Briefly JUSTIFY your answer.

True False (Please CIRCLE your answer)

(d) (Part 1) Argue why the following statement is TRUE.

(Part 2) Is the following statement true or false? Briefly JUSTIFY your answer.

True False (Please CIRCLE your answer)

3. (25 points) there might be multiple parts!

4. (20 points) there might be multiple parts!

5. (16 points) there might be multiple parts!

6. (Bonus) (2 points)

7. (Fun Question)