CS3102 – Theory of Computation

Final Examination – Spring 2015
University of Virginia

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Due: 5pm Friday May 8

- This is a take-home open-book open notes pledged exam.
- Note: while for your convenience the “possession time” of this exam is extended up to 24 hours, the actual “work time” for this exam is up to six contiguous hours.
- No collaborations, Web searches, nor communications with others are allowed during the exam.
- Do as many of the problems as you can; please explain/prove all answers.
- Shorter proofs / explanations are much preferable to longer ones.
- Clearly state the short answer / proof idea first, and then your complete proof / explanation.
- Submit only the pages provided (use more sheets only if absolutely necessary).
- Derive answers on scratch paper first, then copy them neatly onto these pages.

During the exam, please feel free to ask clarifying questions using Email

When you are done with this exam, please return it to me or to a TA (or you may slip your completed exam under the door at 226 Rice Hall).

Good Luck!

Name: ____________________________________________

| Problem 1: | 20 | |
| Problem 2: | 20 | |
| Problem 3: | 20 | |
| Problem 4: | 20 | |
| Problem 5: | 20 | |
| Problem 6: | 20 | |
| Problem 7: | 20 | |
| Total: | 140 | |

“I think you should be more explicit here in step two.”
1) Do ONE of: Problem 7 from problem set 3 [recognizability] OR Problem 41 from problem set 3 OR Problem 6.23 from Sipser 2nd edition

<table>
<thead>
<tr>
<th>Short answer (circle one):</th>
<th>True</th>
<th>False</th>
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Or Proof idea:

Proof:
2) Solve problem 21 on problem set 3.

**Short answer (circle one):**

Yes  No

**Proof:**
3) Solve problem 31g on problem set 3.

**Short answer (circle one):** Decidable Recognizable Not Recognizable

**Proof:**
4) Solve problem 43 on problem set 3.

**Short answer (circle one):**

Yes  No

**Proof:**

**Short answer (proof idea):**

**Proof:**
6) Solve problem 36 on problem set 3.

**Short answer:** Yes No Unknown

**Proof:**
7) Solve problem 3.14 on page 161 of Sipser.

**Proof Idea:**

**Proof:**

"Problems worthy of attack prove their worth by fighting back."
- Paul Erdos (1913-1996)