CS3102 – Theory of Computation

Final Examination – Spring 2016
University of Virginia

Gabriel Robins

- This is a 6-hour take-home open-book, open notes, pledged exam.
- Note: while for your convenience the “possession time” of this exam is up to 24 hours, the actual “work time” to complete this exam should not exceed 6 contiguous hours.
- No collaborations, no 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 algorithms / explanations / proofs are much preferable to longer ones.
- Clearly state the short algorithm / proof idea first, and then your complete algorithm / proof.
- Clearly state the time complexity at the top of the page for each algorithm.
- 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; responses will be posted to the class Web page (so please look at the class Web page often during this exam).

When you are done with this exam, please slip it under my office door (406 Rice Hall).

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) Solve problem 27 on problem set 3.

Short answer (circle one): Yes No

Proof:

**Short answer (proof idea):**

**Proof:**

**Short answer (proof idea):**

**Proof:**
4) Solve problem 41 on problem set 3.

Short answer (circle one): True    False

Proof idea:

Proof:
5) Solve problem 23b on problem set 3.

Short answer (circle one): Yes No

Proof:

**Short answer (proof idea):**

**Proof / algorithm:**
7) Solve problem 36 on problem set 3.

**Short answer (circle one):**

- Possible
- Impossible
- Unknown

**Proof:**

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