CS3102 – Theory of Computation

Midterm Examination – Spring 2015
University of Virginia

Nathan Brunelle
Due: 7pm Monday March 23

• 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: ________________________________

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Total: 140 ____________________
1) Solve problem 2 on problem set 2.

Short answer (circle one): True False

Proof:
2) Solve problem 8 on problem set 2.

**Short answer (circle one):**

a. Yes  
No

**Proof:**

**Short answer (circle one):**

b. Yes  
No

**Proof:**
3) Problem 27 on problem set 2 defines the function ♣, does ♣ preserve NON-regularity?

**Short answer (circle one):**  Yes  No

**Proof:**
4) Solve problem 29 on problem set 2.

**Short answer (circle one):**

- Regular
- Not Regular

**Proof:**
5) Solve problem 16 on problem set 2.

Short answer (circle one):  a. True  False

Proof:

Short answer (circle one):  b. True  False

Proof:
Short answer (circle one):  c. True  False

Proof:

Short answer (circle one):  d. True  False

Proof:
6) Solve problem 33 on problem set 2.

**Short answer (characterization):**

**Proof:**

**Short answer (proof idea):**

**Proof:**

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Simplicity is a great virtue but it requires hard work to achieve it and education to appreciate it. And to make matters worse: complexity sells better.

- Edsger Dijkstra