

## HOMEWORK #3, CPSC 421/501, FALL 2017

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Please note:

- (1) Proofs should be written out formally.
- (2) Homework that is difficult to read may not be graded.
- (3) You may work together on homework, you must write up your own solutions individually. You must acknowledge with whom you worked (specify their `ugrad.cs.ubc.ca` email addresses). You must also acknowledge any sources you have used beyond the textbook and two articles on the class website.
- (4) When you submit your homework to `gradescope.com`, you need to put the solutions to different problems on different pages; `gradescope.com` will ask you to identify which pages correspond to which problems. Please use the problem numbers (1)–(7) below.
- (5) Bonus questions count for marks above the 10% homework grade.

- (1) Problem 7.1.1 of “Uncomputability and Self-Referencing in CPSC 421.” Make sure to hit the refresh button on your browser, since this document has changed as of September 20, 2017.
- (2) Problem 7.1.2.
- (3) Problem 7.1.4.
- (4) Problem 7.2.1.
- (5) Problem 7.2.2.
- (6) Problem 7.2.8.
- (7) Which of the following sets are countable and which aren’t? Give a brief explanation; you may rely on results from the above exercises, and the fact that there is no surjection from a set to its power set. (1)  $\mathbb{N}$ , (2)  $\mathbb{Z}$ , (3)  $\mathbb{Q}$  (the rational numbers), (4)  $\mathcal{A}^*$  over an alphabet  $\mathcal{A}$  (i.e.,  $\mathcal{A}$  is a finite, nonempty set), (5) the set of languages over an alphabet  $\mathcal{A}$ .

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Research supported in part by an NSERC grant.