

GROUP HOMEWORK 1, CPSC 421/501, FALL 2025

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Please note:

- (1) You must justify all answers; no credit is given for a correct answer without justification.
 - (2) Proofs should be written out formally.
 - (3) You do not have to use LaTeX for homework, but **homework that is too difficult to read will not be graded.**
 - (4) You may work together on homework in groups of up to four, **but you must submit a single homework as a group submission under Gradescope.**
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- (0) Who are your group members? Please print if writing by hand.
- (1) Exercise 9.2.2 on the handout “Uncomputability in CPSC421/501.” [Note that although you cannot use Cantor’s theorem, your solution can be inspired by Cantor’s theorem.]
 - (2) Exercise 9.2.3 on the handout “Uncomputability in CPSC421/501.” [Note that although you cannot use Cantor’s theorem, your solution can be inspired by Cantor’s theorem.]
 - (3) Exercise 9.2.5 on the handout “Uncomputability in CPSC421/501.”
 - (4) Exercise 9.2.13 on the handout “Uncomputability in CPSC421/501.” [Note that although you cannot use Cantor’s theorem, your solution can be inspired by Cantor’s theorem.]
 - (5) Cantor’s theorem states that if S is a set, and $f: S \rightarrow \text{Power}(S)$ is a map, then f is not surjective. Does this require that $S \neq \emptyset$, where $\emptyset = \{ \}$, i.e., the empty set? [This means: either (1) show that there is an $f: \emptyset \rightarrow \text{Power}(\emptyset)$ that is surjective, or (2) show that no such f can exist.]¹

¹Based on a conversation after class on September 3, 2025 with CMDV.

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