CSC165, Summer 2014
Assignment 1
Weight: 3%
Solutions

Marking:
-5 marks for incorrect filenames.
-20 marks for not submitting either the tex file or the pdf file if everything else is OK.
25% of the marks ("weak) for any particular question or subquestion for the answer "I don't know."

1. (10 pts.) If you are working in a team of two people, provide the names and CDF login names of the students in the team. If working alone, provide your name and CDF login.

   Sample solution: c3grang, c4potte.

   Marking scheme: Full marks for anything reasonable

2. (10 pts.) List the Computer Science course(s) that you are taking this term. Each member of the team should supply their own list. Please supply the course number and title.

   Sample solution:

   Harry Potter is taking

   (a) CSC151 – Computing for Magic
   (b) CSC152 – Magic for Computing
   (c) CSC165 – Mathematical Expression and Reasoning for Computer Science

   Hermione Granger is taking

   (a) CSC148 – Introduction to Computer Science
   (b) CSC152 – Computing for Magic
   (c) CSC165 – Mathematical Expression and Reasoning for Computer Science

   Marking scheme: Full marks for anything reasonable (students don't have to use lists, tables, etc., the answer just has to look reasonable.)

3. (10 pts.) List the Computer Science course(s) that each team member has taken in the past. **Sample solution:**

   Harry Potter:

Fall 2013	Winter 2014
CSC108	CSC170

Hermione Granger:

Fall 2013	Winter 2014
	CSC170

Marking scheme: Full marks for anything reasonable (students don't have to use lists, tables, etc., the answer just has to look reasonable.)

4. (50 pts.) In class, you have seen that the square root of 2 is irrational, i.e., that there do not exist whole numbers n and m such that $\sqrt{2} = n/m$. Recall that we can express the same statement symbolically like this: $\nexists(n, m), \sqrt{2} = n/m, n \in \mathbb{Z}, m \in \mathbb{Z}$.

   This can be typeset in LaTeX as follows:

   ```
   $\not\exists (n, m), \sqrt{2} = n/m, n \in \mathbb{Z}, m \in \mathbb{Z}$.
   ```

   On the other hand, if you square 5, you get a rational number (namely, $25 = 25/1 = 50/2$). We can express this statement symbolically as follows: $\exists(n, m), 5^2 = n/m, n \in \mathbb{Z}, m \in \mathbb{Z}$. This can be typeset in LaTeX as:

   ```
   $\exists (n, m), 5^2 = n/m, n \in \mathbb{Z}, m \in \mathbb{Z}$
   ```

   Now, instead of the square root, consider division by 2.

   (a) If you divide 7 by 2, do you get a **natural** number? Answer yes or no, and give a symbolic expression that means either "The result of dividing 7 by 2 is a natural number" or "The result of dividing 7 by 2 is not a natural number," depending on which one is true. For this question, you **can** assume that the reader knows the definition of natural numbers. Recall that the set of natural numbers is denoted $\mathbb{N}$ (typeset as `\mathbb{N}` in LaTeX).

   Solution: No, $7/2$ is not a natural number. Some options for expressing this symbolically are:

   i. $\nexists n, 7/2 = n, n \in \mathbb{N}$

   ii. $7/2 \notin \mathbb{N}$

   Marking scheme: Any mathematically correct solution gets 25/25. "Good" for saying $\mathbb{Z}$ to mean "natural numbers." "Good" for reasonable but flawed attempts.

   (b) If you divide 7 by 2, do you get a **rational** number? Answer yes or no, and give a symbolic expression that means either "The result of dividing 7 by 2 is a rational number" or "The result of dividing 7 by 2 is not a rational number," depending on which one is true. For this question, you **cannot** assume that the reader knows the definition of rational numbers.

   Solution: Yes, $7/2$ is a rational number. This can be expressed symbolically as $\exists(n, m), 7/2 = n/m, n \in \mathbb{Z}, m \in \mathbb{Z}$. It is not acceptable to simply state that $7/2 \in \mathbb{Q}$, since we **cannot** assume that the reader knows the definition of rational numbers. However, it is acceptable to say something like $7/2 \in \mathbb{Q}, \mathbb{Q} = \{n/m, n \in \mathbb{Z}, m \in \mathbb{N}\}$

   Marking scheme: 25/25 for anything mathematically correct that doesn't assume the definition of $\mathbb{Q}$. Using $\mathbb{Q}$ without a definition anywhere gets "Weak"