Circle: DGD 1 (Frédéric) LAST NAME (in capitals):
DGD 2 (Yue) First name:
DGD 3 (Andrew)

Marks: /11 Student number:

MAT 1348A (Prof. T. Schmah) — First Homework Assignment
Due Jan. 20, 2016 by 3:00pm

Instructions:

Print out this document and **staple** the pages. You may write on both sides of the paper or insert additional pages if necessary.

Submit a finished, presentable product. *Drafts and illegible papers will not be marked.* Show all relevant work to receive full credit.

Submit the assignment to your TA in the DGD or in the *submission box labeled MAT 1348A* in the Department of Mathematics and Statistics.

Circle the DGD you attend. Your marked paper will be returned to you in that DGD.

Late assignments will not be accepted.

Important note on academic integrity:

Students are permitted, and indeed encouraged, to discuss homework problems with others, but are not permitted to help each other write the final solutions (unless the assignment is explicitly announced as a group assignment). Once you understand a solution, you must write it out entirely by yourself. For each question, any help from other people must be clearly acknowledged, as well as any sources used (e.g. textbooks, websites, videos), if that source contains a solution to a very similar question, or a new method or idea that you used that was not in the course materials. Failure to follow these rules constitutes plagiarism (academic fraud). Note that if one student copies from the other, both students have committed academic fraud. If we believe plagiarism has occurred, the students will receive:

- a mark of 0 for the current assignment if this is the first offence;
- a mark of 0 for the whole assignment component of the course if this is the second offence.

Students are advised to carefully examine the *University Regulations on Academic Integrity* — see

`http://web5.uottawa.ca/mcs-smc/academicintegrity/home.php`

as well as the *Course Policy on Plagiarism* (which applies to this section as well):

`http://mysite.science.uottawa.ca/msajna//teaching/plagiarism_policy.html`

Please sign below to confirm that you have read and understood these regulations and policies, and you agree to act with academic integrity as defined therein.

Student's signature:

1. Write each of the following statements as a compound proposition using correct logical connectives. You must clearly **define the propositional variables** you used in your compound propositions. [5pts]

   (a) Canadians are not fairly represented in the parliament when votes do not count equally or voter turnout is low.
   Compound proposition:

   (b) The government is committed to improving the voting system only if votes count equally.
   Compound proposition:

   (c) In order for voter turnout to be low, it is sufficient that votes do not count equally.
   Compound proposition:

   (d) Canadians will be fairly represented in the parliament if and only if the government is committed to improving the voting system and voter turnout is high.
   Compound proposition:

   (e) Unless voter turnout is high, Canadians will not be fairly represented in the parliament.
   Compound proposition:

   Your propositional variables:

2. Use a **truth table** to determine whether the given set of four propositions is **consistent**. Clearly explain what feature of the truth table supports your answer. [5pts]

$$\left\{ \neg a \vee (b \wedge c),\ (b \to a) \wedge \neg c,\ a \to (b \leftrightarrow c),\ \neg a \leftrightarrow c \right\}$$

3. On the Island of Knights and Knaves you meet two natives, A and B. Given their statements below, what can you determine about their identities? Fully explain your reasoning using truth tables. [6pts]

   (a) B says: "I am a knight only if A is a knight". What do you conclude?

   (b) B says:"I am a knight or A is a knight". What do you conclude?

   (c) In Case (b) above, what do you conclude if A adds: "I am a knave if and only if B is a knight"?