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

Marks: /15

Student number:

## MAT 1348A (Prof. T. Schmah) — Fifth Homework Assignment Due Thursday Mar. 3, 2016 by 11:00am (NOTE new day and time)

## 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 Guidelines on Academic Integrity — see

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

as well as the Course Policy on Plagiarism — see

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. Let A, B, C be three subsets of a universal set. Prove the following using set identities and properties of set operations. *Name each identity that you use.* 

[4pts]

$$(A - \overline{B}) \cap \overline{(A - C)} = \overline{A} \cup (C - B).$$

2. Let A and B be two subsets of a universal set. Give a rigorous proof of the following theorem:

[5pts]

 $A \subseteq B$  if and only if  $A \cup B = B$ .

- 3. For each function below, determine whether or not it is (i) injective (one-to-one), (ii) surjective (onto). *Fully justify your answers.* [6pts]
  - (a)  $f: \mathbb{R} \times \mathbb{R} \to \mathbb{R}$  defined by  $f(x, y) = 2x y^2$
  - (b)  $g: \mathbb{R}^+ \times \mathbb{R} \to \mathbb{R} \times \mathbb{R}$  defined by  $g(x, y) = (3x + 2y, x^2)$