MACM 101 **Midterm Test 2** **Some Day, 2014**

This is a sample!

Last Name _____ First Name and Initials _____

Student No. _____

NO AIDS allowed. Answer ALL questions on the test paper. Use backs of sheets for scratch work.

Total Marks: 100

1. Give a definition of the codomain of a function. [10]

2. Give a definition of an onto function. [10]

3. Relation R is given by matrix [16]

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}.$$

   Is R an order? If yes, what its minimal, maximal, least, and greatest elements are?

4. Make a list of pairs, construct the matrix, and draw the graph of the relation R from the set $A = \{0, 1, 2, 3, 4\}$ to the set $B = \{0, 1, 2, 3\}$ such that $(a, b) \in R$ if and only if $a + b = 4$. [12]

5. Give a definition of a countable set. [10]

6. State the principle of strong induction. [16]

7. Give a definition of a transitive relation. Give an example of a relation which is NOT transitive. [10]

8. Let A, B, and C be sets. Show that [16]

$$(A - B) - C \subseteq A - C.$$

   Draw Venn diagrams for both expressions.