

UNIVERSITY OF MANITOBA

DATE: February 8, 2011

Midterm #1

COURSE: MATH 1210

TITLE PAGE

EXAMINATION: Techniques of Classical & Linear Algebra

TIME: 45 minutes

FAMILY NAME: (Print in ink, capitals) _____

GIVEN NAME(S): (Print in ink, capitals) _____

STUDENT NUMBER: _____

LAB SECTION: _____

SIGNATURE: (in ink) _____

(I understand that cheating is a serious offence. I have read the instructions below twice.)

A01 R. Thomas

A02 T. Mohammed

INSTRUCTIONS TO STUDENTS:

This is a 45 minute exam. **Please show your work clearly.**

No calculators, texts, notes, or other aids are permitted. No cellphones or electronic translators, or other electronic devices able to receive or transmit a signal are permitted.

This exam has a title page and 3 pages of questions. Please check that you have all the pages.

The value of each question is indicated in the lefthand margin beside the statement of the question. The total value of all questions is 35 points.

Question	Points	Score
1	12	
2	5	
3	7	
4	11	
Total:	35	

Answer all questions on the exam paper in the space provided beneath the question. If you need more room, you may continue your work on the reverse side of the previous page, but **CLEARLY INDICATE** that your work is continued.

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- [12] 1. Give in the form $a + bi$, with a and b real, the following, simplified as far as practical:

$$(2 + i2\sqrt{3})^{27}, \quad \left(\frac{2+i}{1-i}\right)e^{2+3i}.$$

- [5] 2. Rewrite the following using sigma notation with index beginning at 1:

$$1(10) - 2(9) + 3(8) - \dots - 10(1).$$

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- [7] 3. (a) Rewrite the sum $8 + 11 + 14 + \cdots + 38$ using sigma notation with index beginning at 1.

(b) Using $\sum_{j=1}^n j = \frac{n(n+1)}{2}$, evaluate the sum given in part (a).

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- [11] 4. Show by mathematical induction that 6 divides $19^n - 13^n$ for all values of n greater than or equal to 1.