

MATH 3U03 Winter 2015 Midterm 1

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Midterm 1
Duration of test: 50 minutes
McMaster University
2015

Write complete answers to **all** questions. Partial credit may be given.
You must justify your solutions to get full marks. You may use results shown in lectures without proving them, but you should make it clear what you are using. Please be sure to include your name and student number on all sheets of paper that you hand in.
The test is marked out of **TODO**, each question being worth **TODO** marks.

1. Consider a nim game with 3 piles of coins, containing 3, 5, and 7 coins respectively. Suppose you are to play first. What move can you make to guarantee a win? Briefly justify your answer.
2. (i) How many ways can the 4 letters of the word "easy" be arranged?
(ii) How many ways can the 8 letters of the words "less easy" (ignore the space) be arranged?
3. 50 pigeonholes are to be allocated to 20 pigeons. To avoid messy fights, no two pigeons are to be allocated the same pigeonhole. Lucky pigeons may be allocated multiple pigeonholes.
Argue that some pigeon must be fortuitous enough to end up with three or more pigeonholes.
4. I throw 10 standard dice, each with 6 sides numbered 1 to 6. What is the probability that I get exactly 58 (i.e. that the total of the ten numbers which fall face up is 58)?