MATH 3U03 Winter 2015 Midterm 2 SAMPLE

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Midterm 2 SAMPLE
Duration of test: 50 minutes
McMaster University
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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. However, if you are explicitly asked to prove a result from lectures, you should prove it and not merely state it!
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 **18**, each question being worth **6** marks.

1. Suppose $(X;\leq)$ is a finite poset.

   (a) [1] What is a **chain** in X?

   (b) [1] What is an **antichain partition** of X?

   (c) [4] Prove that the minimal size of an antichain partition of X is equal to the maximal length of a chain in X.

2. [6]

   (a) [3] How many numbers between 1 and 1000 are divisible by one or more of 5, 7, and 11?

   (b) [3] How many numbers between 1000 and 2000 are divisible by one or more of 4, 6, and 10?

3. (a) [3] Find the generating function for the number h_n of solutions in **odd** positive integers x, y, z to

$$x+y+z=n$$

   .

   (b) [3] Hence, or otherwise, find a formula for h_n.