MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2013
ROUND 2 ARITHMETIC/NUMBER THEORY

ANSWERS

A) _____

B) 20_____

C) _____

A) *A* and *B* are perfect squares. There are no perfect squares between *A* and *B*. If both *A* and *B* are 3-digit integers, what is the maximum value of $A - B$?

B) Today (12-5-2013) falls on a Thursday. In what year does 12-5 next fall on a Thursday?

C) Let *d* be the smallest odd digit that does not appear in the decimal equivalent of $\frac{1}{7}$.

Consider a list of all positive odd 4-digit integers *N* with distinct digits which satisfies these conditions:

- it is a multiple of 11
- it is a multiple of *d*
- it is not divisible by 88% of the 25 primes less than 100.

This list is sorted in order of increasing digitsum. Integers with the same digitsum are sorted in increasing order of magnitude. What is the second integer in the list?