MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 5 - FEBRUARY 2016
ROUND 2 ARITHMETIC / NUMBER THEORY

ANSWERS

A) _____

B) _____

C) _____

A) The units digit of a 3-digit integer is prime. Its hundreds digit is twice its tens digit. How many of these 3-digit integers are prime?

B) How many three-digit natural numbers have <u>at least</u> one 9?

C) Determine the <u>smallest</u> value of n for which $\frac{n!(n+1)!}{2016^3}$ is an integer perfect square.

Recall: $n!$ (read n factorial) denotes the product of all natural numbers from 1 to n inclusive, i.e. $n! = n \cdot (n-1) \cdot (n-2) \cdot \ldots \cdot 2 \cdot 1$.