MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2009
ROUND 5 INEQUALITIES & ABSOLUTE VALUE

******* NO CALCULATORS IN THIS ROUND *******

ANSWERS

A) _____

B) (_____ , _____)

C) _____

A) The complete set of x-values satisfying the inequality $\left(x^2 - 4\right)\left(x^2 - 9\right) > 0$

B) N is 2 more than a multiple of 3, that is, $N = 3k + 2$ for integer values of k.
It is also known that N is <u>at most</u> 96 and <u>at least</u> 16.
The values of k (and only those values) for which this is true satisfy the relation $|k - a| \leq b$, where a and b are <u>integers</u>.
Determine the ordered pair (a, b).

C) A and B are distinct two-digit positive integers with digits reversed.
A and B are both prime, with $A < B$.

Let p denote the number of ordered pairs (A, B).
Let C = the <u>minimum</u> value of $|A - B|$ and
D = the <u>maximum</u> value of $|A - B|$.

<u>How many</u> integers x are there in the range $p \cdot C < x < p \cdot D$?