MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 - NOVEMBER 2015
ROUND 1 COMPLEX NUMBERS (No Trig)

ANSWERS

A) _____

B) _____

C) (_____ , _____)

A) $i^p = -i$ for some *prime* p. Compute the minimum value of $p > 100$.

B) It is easy to verify that $(1+i)^4 = -4$. [$(1+i)^4 = \left((1+i)^2\right)^2 = (2i)^2 = -4$]

For exactly 6 integers k between 1 and 25, the value of $(1+i)^k$ is a real number.

Compute the sum of these 6 powers of $(1+i)$.

C) Let $9i$ be added to the sum of the four 4^{th} roots of 16. If A denotes this sum and $A^3 = a + bi$, compute the ordered pair (a,b).