MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 - NOVEMBER 2016
ROUND 1 COMPLEX NUMBERS (No Trig)

ANSWERS

A) _____

B) _____

C) (_____ , _____)

A) Compute the minimum positive integer A for which $i^A \cdot i^{2A} \cdot i^{4A} \cdot i^{8A} \cdot i^{16A} = i$ is true.

B) Let $z = 0.1 + 6i$. If $a = \frac{1}{z + \overline{z}}$ and $bi = z - \overline{z}$, compute $|a + bi|$.

Recall:
If $z = a + bi$, then the conjugate of z (written $\overline{z}$), is defined as $a - bi$.
$|a + bi| = \sqrt{a^2 + b^2}$, the distance from the origin to the point $P(a, b)$ in the complex plane.

C) One of the two possible values of $(3 + 4i)^{\frac{3}{2}}$ may be written as $A + Bi$, where A and B are positive integers. Compute the ordered pair (A, B).