MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 – NOVEMBER 2012
ROUND 1 COMPLEX NUMBERS (No Trig)

ANSWERS

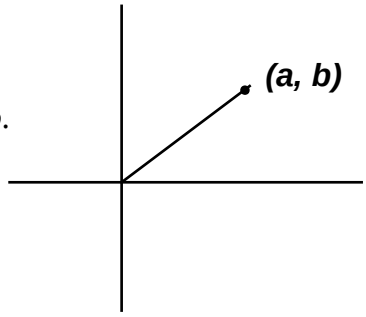
A) (_____ , _____)

B) _____

C) (_____ , _____)

A) Determine the ordered pair of integers (a, b) for which $a+bi=(2-i)(a-i)$.

B) Let $z = a + bi$, where a and b are nonzero integers and $a > b$.
For how many ordered pairs (a, b) does $|z| = 5$?



$|z|$ denotes the absolute value of the complex number,
i.e. its distance from the origin.
Specifically, $|a+bi|=\sqrt{a^2+b^2}$.

C) For complex numbers z_1 and z_2, we have $\begin{cases} z_1^{\,2}+z_2^{\,2}=-41-6i \\ (2-i)z_1z_2=-15-20i \end{cases}$.

Find all possible values of z_1+z_2.