MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 6 – MARCH 2010
ROUND 1 ALG 2: SIMULTANEOUS EQUATIONS AND DETERMINANTS

ANSWERS

A) _____

B) _____

C) (_____ , _____)

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

A) Given: $\begin{cases} y = 17 - 2x \\ y = 3x + 2 \\ y = k \end{cases}$ Determine the value of k for which this system of lines determines a minimum number of points of intersection.

B) Find all ordered pairs (x, y) satisfying $\begin{cases} x - 2y = 1 \\ |x| + |y| = 1 \end{cases}$.

C) Connecting the points $A(3, 7)$, $B(-1, 2)$, $C(3x, -x)$ and $D(10, 1)$ you have an outline of the deck in my backyard. It's a nondescript convex quadrilateral and finding its area is baffling my builders. If $x > 0$ and A and C are opposite vertices, compute the coordinates of C so the area of my deck is 52 square units.

Note: The area of a triangle with vertices at (x_1, y_1), (x_2, y_2) and (x_3, y_3) can be computed as $\frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$.