MASSACHUSETTS MATHEMATICS LEAGUE
DECEMBER 2003
ROUND 3: ANALYTIC GEOMETRY

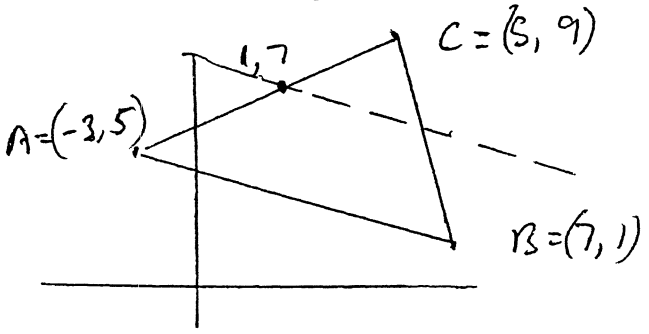
ANSWERS

A) $2x + 5y = 37$

B) -17

C) 48

A) If A = (-3, 5), B = (7, 1), and C = (5, 9), calculate in standard ax + by = c form, the equation of the midline of triangle ABC which is parallel to $\overline{AB}$.



$m_{AB} = \frac{1-5}{7+3} = -\frac{4}{10} = -\frac{2}{5}$

midline is $2x + 5y = 2 + 35 = 37$

B) If A = (5, -6), B = (1, 2), and C = (k, k); calculate the value of k so that $\overline{AB} \perp \overline{AC}$.

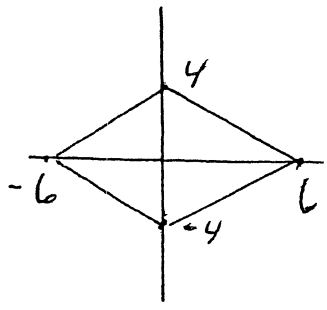
$m_{AB} = \frac{-6-2}{5-1} = \frac{-8}{4} = -2, \quad m_{AC} = \frac{k+6}{k-5}$

$\frac{k+6}{k-5} = \frac{1}{2}, \quad 2k + 12 = k - 5$

$k = -17$

C) Calculate the area of the region enclosed by the graph of the equation $2|x - 3| + 3|y + 5| = 12$.

Translate to the origin to get $2|x| + 3|y| = 12$



Area $= 4 \cdot 12 = 48$