MASSACHUSETTS MATHEMATICS LEAGUE
MARCH 2004
ROUND 1: SIM. EQUATIONS & DET.

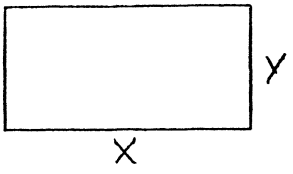
ANSWERS

A) $\ell = 300, w = 100$

B) 740

C) $2, -19/4$

A) A rectangular cafeteria has a perimeter of 800 feet, and an area of 30, 000 square feet. Find the number of feet in the length and in the width of the cafeteria.



$X + Y = 400, \quad XY = 30,000$

$X(400 - X) = 30,000, \quad X^2 - 400X + 30,000 = 0$

$(X - 100)(X - 300) = 0$

$X = 300, \quad Y = 100$

B) Lia is offered two different salary options to sell health club memberships. Plan A is: \$500 weekly in addition to 6% of her sales; while Plan B is: \$700 weekly in addition to 1% of her sales. Lia realized that she could get the same salary for a week under both plans. What is that salary?

$y = .06x + 500, \quad y = .01x + 700$

$.06x + 500 = .01x + 700, \quad .05x = 200, \quad x = 4000$

$y = 740$

C) Solve for x: $\begin{vmatrix} 1 & -3 & x \\ x & 4 & -1 \\ -2 & 4 & 1 \end{vmatrix} = 40$

$1 \quad -3 \quad x \quad 1 \quad -3$

$x \quad 4 \quad -1 \quad x \quad 4$

$-2 \quad 4 \quad 1 \quad -2 \quad 4$

$4 - 6 + 4x^2 + 3x + 4 + 8x = 40$

$4x^2 + 11x + 2 = 40, \quad 4x^2 + 11x - 38 = 0$

$(4x + 19)(x - 2) = 0$

$x = 2 \text{ or } -19/4$