MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 - NOVEMBER 2007 SOLUTION KEY

Round 4

A) Clearing fractions, $3 + 4(x - 1) + (x - 1)^2 = x^2 + 2x = x(x + 2) = 0 \rightarrow x =$ **<u>0, -2</u>**

B) Multiplying out the product we have $(3 + AB) - (A + B)\sqrt{3}$.
Equating coefficients, $3 + AB = -17$ and $A + B = -1$
Substituting for B in the first equation, $3 + A(-A - 1) = -17 \rightarrow A^2 + A - 20 = (A + 5)(A - 4) = 0$
$\rightarrow A = -5$ and $B = 4$ or $A = 4$ and $B = -5$
Since $A > B$, $(A, B) =$ **<u>(4, -5)</u>**

C) LCD $= (x - 2)(x + 4)(x + 1) \rightarrow 2x(x + 1) + 4(x - 2) - (x + 3)(x + 4) = 0$
$\rightarrow 2^{x2} + 2x + 4x - 8 - x^2 - 7x - 12 = x^2 - x - 20 = (x - 5)(x + 4) = 0$
$\rightarrow \boldsymbol{x} =$ **<u>5</u>** (-4 causes division by zero and is extraneous)