MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 – NOVEMBER 2008 SOLUTION KEY

Round 4

Note: *Equivalents answers are allowed where terms within any individual factor have been rearranged or where pairs of factors have each been multiplied by -1.*

A) $4x^4 + 1 - 5x^2 = 4x^4 - 5x^2 + 1 = (4x^2 - 1)(x^2 - 1) =$ **$\underline{(2x + 1)(2x - 1)(x + 1)(x - 1)}$**

B) Combine like terms and regroup.
$9x^2 - 18 - 9A + 7x^2 - 7A^2 + 3A + 9 + 6A^2 = 16x^2 - A^2 - 6A - 9$
$\rightarrow (4x)^2 - (A^2 + 6A + 9) = (4x)^2 - (A + 3)^2 =$ **$\underline{(4x - A - 3)(4x + A + 3)}$**

C) $8x^5 + 38x^3y^2 + 50xy^4 = 2x\left(4x^4 + 19x^2y^2 + 25y^4\right) = 2x\left(4x^4 + 20x^2y^2 + 25y^4 - x^2y^2\right)$

$2x\left(\left(4x^4 + 20x^2y^2 + 25y^4\right) - x^2y^2\right) = 2x\left(\left(2x^2 + 5y^2\right)^2 - (xy)^2\right) =$
$\underline{2x\left(2x^2 + xy + 5y^2\right)\left(2x^2 - xy + 5y^2\right)}$