MASSACHUSETTS MATHEMATICS LEAGUE
NOVEMBER 2003
ROUND 4: ALGEBRA I FACTORING

ANSWERS

A) $x(x-1)(x-4)(x-5)$

B) $4, 5, 6$

C) $29, 31, 33$ or $-5, -3, -1$

A) Factor completely: $(x^2 - 5x + 2)^2 - 4$

$(x^2 - 5x + 2 + 2)(x^2 - 5x + 2 - 2) = (x^2 - 5x + 4)(x^2 - 5x)$

$(x - 1)(x - 4)(x - 5)x$

B) Solve for x: $(x - 5)^3 + 5 = x$

$(x-5)^3 - (x-5) = 0 \qquad (x-5)[(x-5)^2 - 1] = 0$

$(x-5)(x-5+1)(x-5-1) = 0$

$(x-5)(x-4)(x-6) = 0$

$x = 4, 5, 6$

C) Find three consecutive odd integers such that four times the square of the third diminished by three times the square of the first is 89 less than two times the square of the second.

$x, x+2, x+4 \qquad 4(x+4)^2 - 3x^2 = 2(x+2)^2 - 89$

$4x^2 + 32x + 64 - 3x^2 = 2x^2 + 8x + 8 - 89$

$x^2 + 32x + 64 = 2x^2 + 8x - 81$

$x^2 - 24x - 145 = 0 \qquad (x+5)(x-29) = 0$

$-5, -3, -1$ or $29, 31, 33$