MASSACHUSETTS MATHEMATICS LEAGUE
OCTOBER 2003
ROUND 5: INEQUALITIES & ABSOLUTE VALUES

ANSWERS

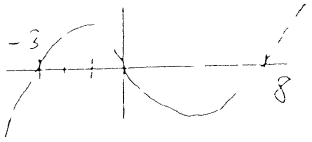
A) $x < -3, \ 0 < x < 8$

B) $-1, \ 2, \ 3$

C) $x > 1/8, \ x < -1/3$

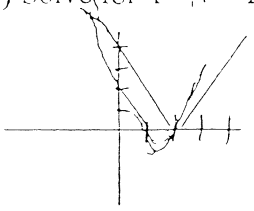
$x^3 - 5x^2 - 24x < 0$

$x(x+3)(x-8) < 0$



ans $x < -3, \ 0 < x < 8$

B) Solve for x $|4 - 2x| = x^2 - 3x + 2$



If $x \leq 2$ $\quad 4 - 2x = x^2 - 3x + 2$

$x^2 - x - 2 = 0$

$(x+1)(x-2) = 0$

$x = -1, \ x = 2$

If $x > 2$ $\quad 2x - 4 = x^2 - 3x + 2$

$0 = x^2 - 5x + 6$

$x = 2$ or 3

no intersection for $x > 2$

$\therefore x = 2, 3$

C) Solve for x $\frac{1}{x^2} - \frac{5}{x} < 24$

$\frac{1}{x^2} - \frac{5}{x} - 24 < 0$

$-24x^2 - 5x + 1 < 0$

$24x^2 + 5x - 1 > 0$

$(8x - 1)(3x + 1) > 0$

ans $x > \frac{1}{8}, \ x < -\frac{1}{3}$