Additional Practice Solving Rational Equations and Inequalities

1. Use an efficient technique to solve the following rational equations.

a) $\frac{8}{(x+1)} + \frac{2x}{x+3} = 3$

$\frac{8(x+3)+2x(x+1)}{(x+3)(x+1)} = \frac{3}{1}$

$\frac{2x^2+10x+24}{x^2+4x+3} = \frac{3}{1}$

$3x^2+12x+9 = 2x^2+10x+24$

$x^2+2x-15=0$

$(x+5)(x-3)=0$

$x=-5$ or 3

b) $\frac{3}{x+5} = \frac{5-x}{8}$

$(x+5)(5-x)=24$

$5x-x^2+25-5x=24$

$0=x^2-1$

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

$x=\pm 1$

c) $\frac{x+4}{x} + \frac{x+10}{4x} = \frac{x-6}{4}$

$4(x+4)+(x+10)=x(x-6)$

$5x+26=x^2-6x$

$0=x^2-11x-26$

$0=(x-13)(x+2)$

$x=13$ or -2

d) $\frac{x+3}{3x^2+8x-3} = \frac{x^2-3x-10}{x^2-25}$

$P(-9)\ S(8)\ \}\ -9,-1$

Decomposition

$3x^2+8x-3$

$=3x^2+9x-x-3$

$=3x(x+3)-1(x+3)$

$=(3x-1)(x+3)$

$\frac{(x+3)}{(3x+1)(x+3)} = \frac{(x-5)(x+2)}{(x-5)(x+5)}$

$(3x+1)(x+2) = x+5, \quad x\neq -3, 5$

$3x^2+5x-2 = x+5$

$3x^2+4x-7=0$ $\quad P(-21)\ S(4)\ \}\ 7,-3$

$3x^2+7x-3x-7=0$

$x(3x+7)-1(3x+7)=0$

$(x-1)(3x+7)=0$

$x=1$ or $-\frac{7}{3}$

e) $\frac{3x^2-6x}{x^2-x-2} + \frac{8x}{2x+4} = 4$

$\frac{3x(x-2)}{(x-2)(x+1)} + \frac{2(4x)}{2(x+2)} = 4$

$\frac{(3x)(x+2)}{(x+1)(x+2)} + \frac{4x(x+1)}{(x+2)(x+1)} = 4, \quad x\neq 2$

$\frac{3x^2+6x+4x^2+4x}{x^2+3x+2} = \frac{4}{1}$

$7x^2+10x = 4x^2+12x+8$

$3x^2-2x-8=0$ $\quad P(-24)\ S(-2)\ \}\ -6,4$

$3x^2-6x+4x-8=0$

$3x(x-2)+4(x-2)=0$

$(3x+4)(x-2)=0$

$x=2$ (inadmissible) or $x=-\frac{4}{3}$

f) $\frac{8}{x-1} - \frac{2x}{1} + \frac{4}{1} = \frac{x+1}{2}$

$16-4x(x-1)+8(x-1)=(x-1)(x+1)$

$16-4x^2+4x+8x-8=x^2-1$

$0=5x^2-12x-9$ $\quad P(-45)\ S(-12)\ \}\ -15,3$

$0=5x^2-15x+3x-9$

$0=5x(x-3)+3(x-3)$

$0=(5x+3)(x-3)$

$x=-\frac{3}{5}$ or 3

2. Solve the following inequalities.

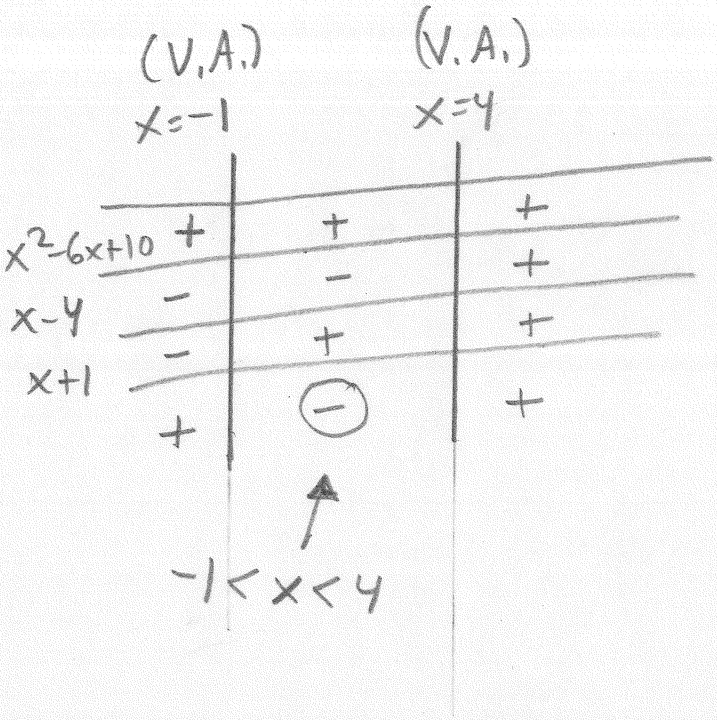
a) $\frac{x-2}{x+1} \leq -\frac{2}{x^2-3x-4}$

$\frac{(x-4)(x-2)}{(x-4)(x+1)} + \frac{2}{(x-4)(x+1)} \leq 0$

$\frac{x^2-6x+10}{(x-4)(x+1)} \leq 0$

b^2-4ac
$=(-6)^2-4(1)(10)$
$=36-40$
$=-4$
∴ No Soln
→ no x-ints

V.A. @ $x=4$
$x=-1$



b) $\frac{1}{x-6} \leq \frac{2}{x+2}$

$\frac{(x+2)(1)}{(x+2)(x-6)} - \frac{(2)(x-6)}{(x+2)(x-6)} \leq 0$

$\frac{x+2-2x+12}{(x+2)(x-6)} \leq 0$

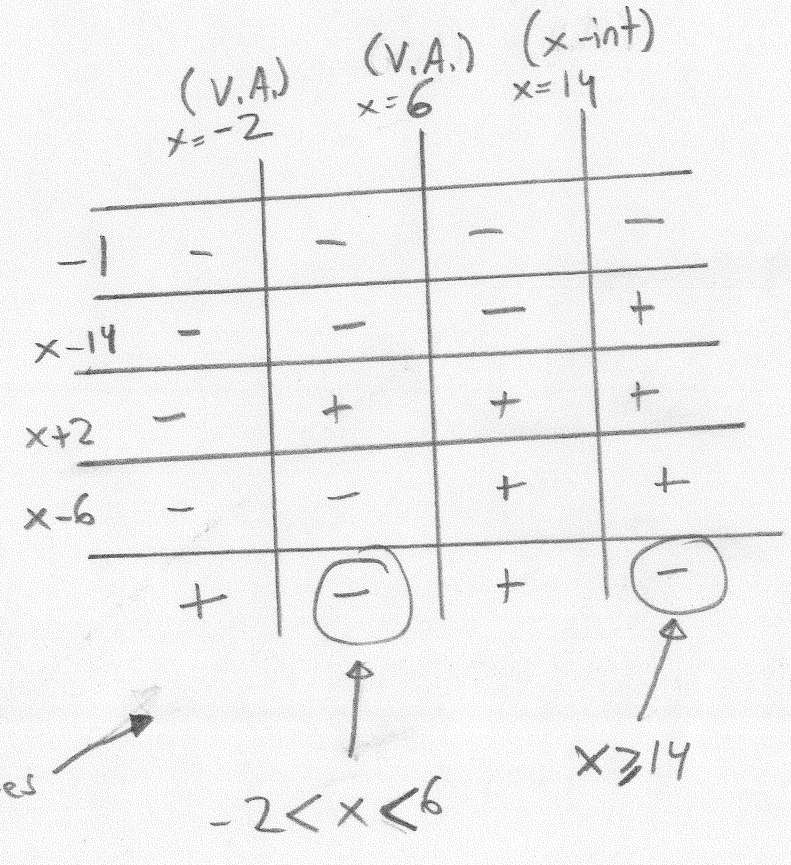
$\frac{-x+14}{(x+2)(x-6)} \leq 0$

$\frac{-(x-14)}{(x+2)(x-6)} \leq 0$

x-int: 14

V.A. @ $x=-2$, $x=6$

look for negatives



Homework: pg 285 # 2b, 3b, 5bd, 6bd, 7bd, pg 295 # 4bdf, 5bdf, (9)