

Rational Inequalities

1) $\frac{x+2}{x+3} < \frac{x-1}{x-2}$

C.P $x = -3$
 $x = 2$

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

$(x-2)(x+2) = x-1(x+3)$

~~$x^2 - 4$~~ $x^2 + 2x - 3$

$-4 = 2x - 3$
 $+3 \quad +3$

$-1 = 2x$

$-\frac{1}{2} = x$

$(-3, -\frac{1}{2}) \cup (2, \infty)$



$\frac{-4+2}{-4+3} < \frac{-4-1}{-4-2}$

$\frac{-2}{-1} < \frac{-5}{-6}$

~~$2 < 5/6$~~

$\frac{-1+2}{-1+3} < \frac{-1-1}{-1-2}$

$\frac{1}{2} < \frac{-2}{-3}$

$\frac{1}{2} < 2/3 \checkmark$

$\frac{1+2}{1+3} < \frac{1-1}{1-2}$

~~$3/4 < 0$~~

$\frac{3+2}{3+3} < \frac{3-1}{3-2}$

$5/6 < 2 \checkmark$

2) $1 + \frac{2}{x+1} \leq \frac{2}{x}$ C.P $x = -1$
 $x = 0$

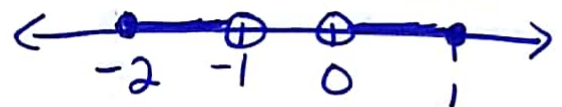
$x(x+1) + 2x = 2(x+1)$
 $x^2 + x + 2x = 2x + 2$
 ~~$-2x$~~ ~~$-2x$~~

$x^2 + x - 2 = 0$

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

$x = -2 \quad x = 1$

$(-2, -1] \cup (0, 1]$



X	$(1 + \frac{2}{x+1})$	$\frac{2}{x}$
-3	0	-0.67
-1.5	-3	-1.33 ✓
-1	5	-4
-0.5	2.3	4 ✓
2	1.67	1

$$3) \frac{3x-1}{x^2-x-6} \leq 1$$

C.P.
 $x=3$
 $x=-2$

$(x+3)$
 $(x+2)$

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

$$3x-1 = x^2-x-6$$

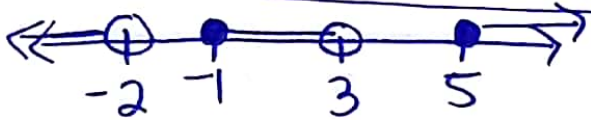
$$-3x+1 \quad -3x+1$$

$$0 = x^2 - 4x - 5$$

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

$$x=5 \quad x=-1$$

$$(-\infty, -2) \cup [-1, 3) \cup [5, \infty)$$



X	Y_1	Y_2	
-3	-1.67	1	✓
-1.5	2.44	1	
0	.167	1	✓
4	1.83	1	
6	.71	1	✓

$$4) \frac{x^2-9}{x^2-3x+2} < 0$$

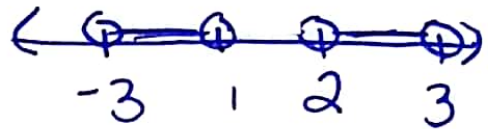
C.P.
 $x=2$
 $x=1$

$$\frac{(x-3)(x+3)}{(x-2)(x-1)} = 0$$

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

$$x=3 \quad x=-3$$

$$(-3, 1) \cup (2, 3)$$



X	Y_1	Y_2	
-4	.23	0	
0	-4.5	0	✓
1.5	2.7	0	
2.5	-3.67	0	✓
4	1.11	0	

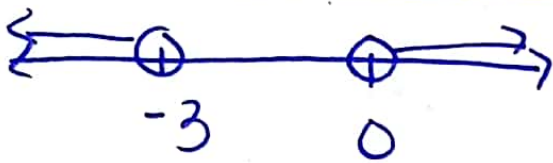
$x \quad x \quad x \quad \text{C.D } x=0$
 5) $\frac{6}{x} + 2 \geq 0$

$$6 + 2x \geq 0$$

$$2x \geq -6$$

$$x \geq -3$$

$$(-\infty, -3) \cup (0, \infty)$$



X	y_1	Z	y_2
-4	.5		0 ✓
-1	-4		0
1	8		0 ✓

$x-1 \quad x-1 \quad \text{C.D } x=1$
 6) $x - \frac{10}{x-1} < 4$

$$x(x-1) - 10 = 4(x-1)$$

$$x^2 - x - 10 = 4x - 4$$

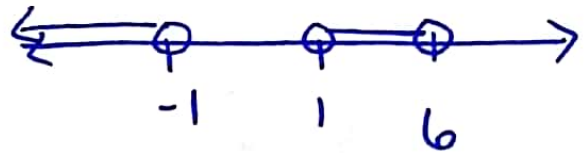
$$-4x + 4 \quad -4x + 4$$

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

$$(x-6)(x+1) = 0$$

$$x=6 \quad x=-1$$

$$(-\infty, -1) \cup (1, 6)$$



X	y_1	Z	y_2
-2	1.34		4 ✓
0	10		4
2	-8		4 ✓
7	5.34		4

$$3(2x+3) \quad 3(2x+3) \quad \text{C.P.}$$

$$7) \frac{3x-8}{2x+3} < \frac{2}{3} \quad X = \frac{-3}{2}$$

$$3(3x-8) = 2(2x+3)$$

$$9x - 24 = 4x + 6$$

$$5x - 24 = 6$$

$$+24 \quad +24$$

$$5x = 30$$

$$x = 6$$

$$\left(-\frac{3}{2}, 6\right)$$



X	Y_1	Y_2
-3	5.67	.67
0	-2.67	.67 ✓
1	.76	.67

$$(x+8) \quad (x+20) \quad (x+8) \quad (x+20)$$

$$8) \frac{x}{x+20} < \frac{2}{x+8} \quad \text{C.P.}$$

$$X = -20$$

$$X = -8$$

$$X(X+8) = 2(X+20)$$

$$X^2 + 8X = 2X + 40$$

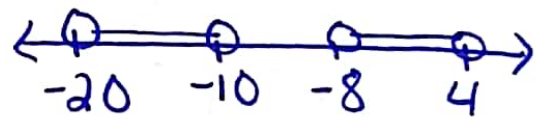
$$-2X - 40 \quad -2X - 40$$

$$X^2 + 6X - 40 = 0$$

$$(X+10)(X-4) = 0$$

$$X = -10 \quad X = 4$$

$$\left(-20, -10\right) \cup \left(-8, 4\right)$$



X	Y_1	Y_2
-21	21	-.15
-15	-3	-.28 ✓
-9	-.818	-.2
0	0	.25 ✓
5	.2	.15