

Algebra 2.7 Move on Inequalities

Inequalities of degree 2 or more

Solve $x^2 - 6x + 8 > 0$ \leftarrow needs to be positive

$$(x-4)(x-2) > 0$$

$x = 4, 2$ are test values

$$(-\infty, 2) \cup (4, \infty)$$

Sign of $x-4$	-	-	+
Sign of $x-2$	+	+	+
Sign of all	+	-	+
	0	2	4

Solve $(x-1)(x+7)(5-x) \leq 0$ \leftarrow want ≤ 0

$x = 1, -7, 5$ (test values)

$$[-7, 1] \cup [5, \infty)$$

Sign of $x-1$	-	-	+	+
Sign of $x+7$	-	+	+	+
Sign of $5-x$	+	+	+	-
	-7	1	5	

Solve $6x^3 + 12x^2 - 7x - 14 \leq 0$ \leftarrow want ≤ 0

$$6x^2(x+2) - 7(x+2) \leq 0$$

$$(x+2)(6x^2 - 7) \leq 0$$

$$x = -2, \pm\sqrt{\frac{7}{6}}$$

$$(-\infty, -2] \cup [-\sqrt{\frac{7}{6}}, \sqrt{\frac{7}{6}}]$$

Sign of $x+2$	-	+	+	+
Sign of $6x^2-7$	+	+	-	+
all	+	+	-	+
	-2	$\pm\sqrt{\frac{7}{6}}$	0	$\pm\sqrt{\frac{7}{6}}$

Solve $\frac{x-3}{x^2-4x-21} \geq 0$ \leftarrow pos $\frac{+}{+}$

$$\frac{x-3}{(x+3)(x-7)} \geq 0$$

Sign of $x-3$	-	-	+	+
Sign of $x-7$	-	-	+	+
Sign of $x+3$	-	+	+	+
all	-	+	-	+
	-3	3	7	

test values 3, 7, -3, but $x \neq -3, 7$ (use parens/put brackets)

$$(-3, 3] \cup (7, \infty)$$

Solve $\frac{-6x}{x^2-36} > 0$ \leftarrow $\frac{-}{+}$

$$\frac{-6x}{(x+6)(x-6)}$$

test values

$$x = 0, -6, 6$$

$$x \neq 6, -6$$

Sign of $-6x$	+	+	-	-
Sign of $x+6$	-	+	+	+
Sign of $x-6$	-	-	-	+
all	+	-	+	-
	-6	0	6	∞

$$(-\infty, -6) \cup (0, 6)$$

Solve

$$\frac{(x+1)^2(5+x)}{(x+3)^2(x-3)} \leq 0$$

wool not #

~~x = -3, 3~~

test values -4, 5, -3, 3

$(x+1)^2$	+	+	+	+	+
$(5+x)$	+	+	+	+	-
$(x+3)^2$	+	+	+	+	+
$(x-3)$	-	-	-	+	+
all	⊖	⊖	⊖	+	⊖
	-4	-3	3	5	

~~$(-\infty, 3) \cup [5, \infty)$~~

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