

1.5 Inequalities WS 2

Name KEY

Use the critical value method to solve each polynomial inequality. Use interval notation to write each solution set.

1.  $(x+1)(x-2)(x+4) < 0$

c.v. -1, 2, -4

$x+1$	-		-		+		+
$x-2$	-		-		-		+
$x+4$	-		+		+		+
	min			min			
	$\ominus$	-4	$\oplus$	-1	$\ominus$	2	$\oplus$

$(-\infty, -4) \cup (-1, 2)$

2.  $x^2 + 9x + 20 \geq 0$

$(x+5)(x+4) \geq 0$

c.v. -4, -5

$x+5$	-		+		+
$x+4$	-		-		+
	min				
	$\oplus$	-5	$\ominus$	-4	$\oplus$

$(-\infty, -5] \cup [-4, \infty)$

3.  $x^3 - 3x^2 - 4x + 12 \leq 0$

$x^2(x-3) - 4(x-3) \leq 0$

$(x+2)(x-2)(x-3) \leq 0$

c.v. -2, 2, 3

$x+2$	-		+		+		+
$x-2$	-		-		+		+
$x-3$	-		-		min		+
	min			min			
	$\ominus$	-2	$\oplus$	2	$\ominus$	3	$\oplus$

$(-\infty, -2] \cup [2, 3]$

4.  $2x^2 - 32x + 78 > 0$

$2(x^2 - 16x + 39) > 0$

$2(x-3)(x-13) > 0$

c.v. 3, 13

2	+		+		+
$x-3$	-		+		+
$x-13$	-		-		+
	min				
	$\oplus$	3	$\ominus$	13	$\oplus$

$(-\infty, 3) \cup (13, \infty)$

5.  $x^3 + 2x^2 - x - 2 \leq 0$

$x^2(x+2) - 1(x+2) \leq 0$

$(x-1)(x+1)(x+2) \leq 0$

c.v. 1, -1, -2

$x-1$	-		-		-		+
$x+1$	-		-		+		+
$x+2$	-		+		+		+
	min			min			
	$\ominus$	-2	$\oplus$	-1	$\ominus$	1	$\oplus$

$(-\infty, -2] \cup [-1, 1]$

6.  $x^4 - 5x^2 + 4 \geq 0$

$x^4 - 5x^2 + 4 \geq 0$

$(x^2-4)(x^2-1) \geq 0$

$(x+2)(x-2)(x+1)(x-1) \geq 0$

c.v. -2, 2, -1, 1

$x+2$	-		+		+		+
$x-2$	-		-		-		+
$x+1$	-		-		+		+
$x-1$	-		-		+		+
	min			min			
	$\oplus$	-2	$\ominus$	-1	$\oplus$	1	$\ominus$
							$\oplus$

$(-\infty, -2] \cup [-1, 1] \cup [2, \infty)$

Use the critical value method to solve each rational inequality. Use interval notation to write each solution set.

7.  $\frac{3x+1}{x+4} > 2 \quad x \neq -4$

$$\frac{3x+1}{x+4} - \frac{2(x+4)}{x+4} > 0$$

$$\frac{3x+1-2x-8}{x+4} > 0$$

$$\frac{x-7}{x+4} > 0$$

c.v. 7, -4

$x-7$	-	-	+
$x+4$	-	+	+

(+)-4 (-)7 (+)

$$\boxed{(-\infty, -4) \cup (7, \infty)}$$

8.  $\frac{x^2-4}{x+3} \leq 0 \quad x \neq -3$

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

c.v. -2, 2, -3

$x+2$	-	-	+	+
$x-2$	-	-	-	+
$x+3$	-	+	+	+

(-)-3 (+)-2 (-)2 (+)

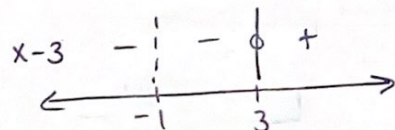
$$\boxed{(-\infty, -3) \cup [-2, 2]}$$

9.  $\frac{x^2-2x-3}{x+1} \geq 0$

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

c.v. -1, 3

$$x-3 \geq 0$$



$$\boxed{[3, \infty)}$$

10.  $\frac{1}{x-3} + 4 < 0$

$$\frac{1+4x-12}{x-3} < 0$$

$$\frac{4x-11}{x-3} < 0 \quad x \neq 3$$

c.v. 3,  $\frac{11}{4}$

$4x-11$	-	+	+
$x-3$	-	-	+

(+) $\frac{11}{4}$  (-)3 (+)

$$\boxed{\left(\frac{11}{4}, 3\right)}$$

11.  $\frac{x^2+x-6}{x^2-4x+3} \leq 0 \quad x \neq 3, 1$

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

c.v. -3, 1, 2, 3

$x+3$	-	+	+	+
$x-2$	-	-	+	+
$x-3$	-	-	-	+
$x-1$	-	+	+	+

(+)-3 (-)1 (+)2 (-)3 (+)

$$\boxed{[-3, 1) \cup [2, 3]}$$

12.  $\frac{x^2+9x+18}{x+4} \geq 0 \quad x \neq -4$

$$\frac{(x+6)(x+3)}{x+4} \geq 0$$

c.v. -6, -3, -4

$x+6$	-	+	+	+
$x+3$	-	-	-	+
$x+4$	-	-	+	+

(-)-6 (+)-4 (-)3 (+)

$$\boxed{[-6, -4) \cup [-3, \infty)}$$