

1.5 Polynomial Inequalities WS

Name KEY

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

1. $x^2 + 2x - 15 \leq 0$

$$(x+5)(x-3) \leq 0$$

c.v. = -5, 3

$x+5$	-		+		+
$x-3$	-		-		+
	+		-5	-	
	-		3	+	

$$[-5, 3]$$

2. $x^3 + 4x^2 > x + 4$

$$x^3 + 4x^2 - x - 4 > 0$$

$$x^2(x+4) - 1(x+4) > 0$$

$$(x+1)(x-1)(x+4) > 0$$

c.v. = -1, 1, -4

$x+1$	-		-		+		+
$x-1$	-		-		+		+
$x+4$	-		+		+		+
	-		-4	+		-	
	+		-1	-		+	

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

3. $x^2 - 6x + 8 \geq 0$

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

c.v. = 2, 4

$x-4$	-		-		+
$x-2$	-		+		+
	+		2	-	
	-		4	+	

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

4. $-2x^2 + 10 < 8x$

$$-2x^2 - 8x + 10 < 0$$

$$-2(x^2 + 4x - 5) < 0$$

$$-2(x+5)(x-1) < 0$$

c.v. = -5, 1

-2	-		-		-
$x+5$	-		+		+
$x-1$	-		-		+
	-		-5	+	
	+		1	-	

$$(-\infty, -5) \cup (1, \infty)$$

5. $x^4 - 10x^2 + 9 \geq 0$

$$(-\infty, -3] \cup [-1, 1] \cup [3, \infty)$$

6. $2x^2 + 3x > 0$

$$x(2x+3) > 0$$

c.v. = 0, $-\frac{3}{2}$

x	-		-		+
$2x+3$	-		+		+
	+		$-\frac{3}{2}$	-	
	-		0	+	

$$(-\infty, -\frac{3}{2}) \cup (0, \infty)$$

$$7. x^3 - 3x^2 - 9x + 27 \leq 0$$

$$x^2(x-3) - 9(x-3) \leq 0$$

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

$$\text{C.V.} = -3, 3$$

$x-3$	-		-		+
$x+3$	-		+		+
$x-3$	-		-		+
	⊖		-3		⊕
			3		⊕

$(-\infty, -3]$

$$8. \text{ ~~} x^2 < 3x - 2 \text{ }~~$$

$$x^2 < 3x - 2$$

$$x^2 - 3x + 2 < 0$$

$$(x-2)(x-1) < 0$$

$$\text{C.V.} = 2, 1$$

$x-2$	-		-		+
$x-1$	-		+		+
	⊕		1		⊖
			2		⊕

$(1, 2)$

$$9. x^3 \geq 9x^2$$

$$x^3 - 9x^2 \geq 0$$

$$x^2(x-9) \geq 0$$

$$\text{C.V.} = 0, 9$$

x^2	+		+		+
$x-9$	-		-		+
	⊖		0		⊖
			9		⊕

$[9, \infty)$

10. A shoe manufacturer finds that the monthly revenue R from a particular style of aerobics shoe is given by $R = 312x - 3x^2$, where x is the price in dollars of each pair of shoes sold. Find the interval, in terms of x , for which the monthly revenues is greater than or equal to \$5925.

$$5925 \leq 312x - 3x^2$$

$$3x^2 - 312x + 5925 \leq 0$$

$$3(x^2 - 104x + 1975) \leq 0$$

$$3(x-25)(x-79) \leq 0$$

$$\text{C.V.} = 25, 79$$

3	+		+		+
$x-25$	-		+		+
$x-79$	-		-		+
	⊕		25		⊖
			79		⊕

$[\$25, \$79]$