

Example 4 p55

$$2x^2 + 3x \leq 20$$

- Solve the above inequality graphically and algebraically

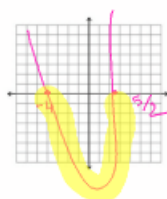
Graphically

$$2x^2 + 3x \leq 20$$

$$\begin{aligned} 2x^2 + 3x &= 20 \\ -20 &-20 \\ 2x^2 + 3x - 20 &= 0 \end{aligned}$$

$$\begin{array}{r} 8 \overline{) 2x^2 + 3x - 20} \\ \underline{-16x - 40} \\ 8x - 40 \\ \underline{-8x + 20} \\ -20 \end{array}$$

$$[-4, \frac{5}{2}]$$



$$(x + \frac{8}{2})(x - \frac{5}{2}) \quad (\text{note } a \neq 1 \text{ divide by } a)$$

$$(x + 4)(2x - 5) = 0$$

$$\begin{aligned} x + 4 &= 0 \\ x &= -4 \end{aligned}$$

$$\begin{aligned} 2x - 5 &= 0 \\ 2x &= 5 \\ x &= \frac{5}{2} \end{aligned}$$

Algebraically

$$\begin{array}{c} = -4 \quad + \quad 0 \quad \frac{5}{2} \quad + \\ \leftarrow \quad + \quad - \quad - \quad + \end{array}$$

whole expression

$$\text{Solution of } 2x^2 + 3x - 20 \leq 0 \quad [-4, \frac{5}{2}]$$

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$$x^2 + 2x + 2 < 0 \quad \text{No solution}$$

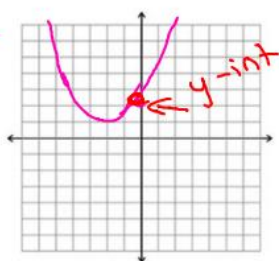
below the x-axis (Never)

$$\begin{array}{r} 2 \\ \times \\ 2 \end{array}$$

Non Factorable

Quadratic formula

imaginary solution $\rightarrow$ parabola does not touch the x-axis



$$\begin{aligned} b^2 - 4ac &= 2^2 - 4(1)(2) \\ &= 4 - 8 \\ &= -4 < 0 \end{aligned}$$

In Exercises 9–16, solve the inequality. Use algebra to solve the corresponding equation.

9. $2x^2 + 17x + 21 \leq 0$ 10. $6x^2 - 13x + 6 \geq 0$

11. $2x^2 + 7x > 15$ 12. $4x^2 + 2 < 9x$

13. $2 - 5x - 3x^2 < 0$ 14. $21 + 4x - x^2 > 0$

15. $x^3 - x \geq 0$ 16. $x^3 - x^2 - 30x \leq 0$

In Exercises 17–26, solve the inequality graphically.

17. $x^2 - 4x < 1$ 18. $12x^2 - 25x + 12 \geq 0$

19. $6x^2 - 5x - 4 > 0$ 20. $4x^2 - 1 \leq 0$

21. $9x^2 + 12x - 1 \geq 0$ 22. $4x^2 - 12x + 7 < 0$

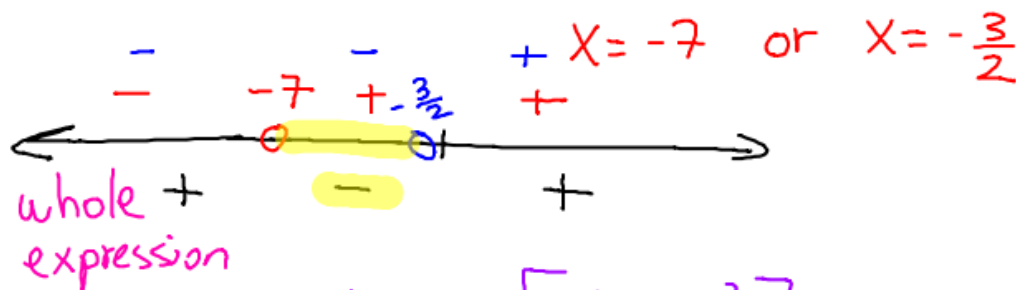
23. $4x^2 + 1 > 4x$ 24. $x^2 + 9 \leq 6x$

25. $x^2 - 8x + 16 < 0$ 26. $9x^2 + 12x + 4 \geq 0$

9. $2x^2 + 17x + 21 \leq 0$

~~$\begin{array}{cc} 42 & 3 \\ 14 & 17 \end{array}$~~

$(x + \frac{14}{2})(x + \frac{3}{2})$
 $(x + 7)(2x + 3)$



Solution $[-7, -\frac{3}{2}]$

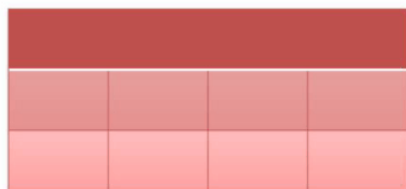
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$\frac{x^3}{x} - \frac{x}{x} \geq 0$

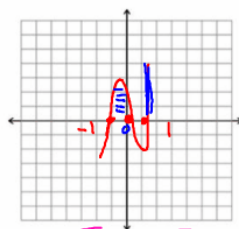
$x(x^2 - 1)$

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

$x = 0 \text{ or } x = 1 \text{ or } x = -1$



$a^2 - b^2 = (a-b)(a+b)$



$[-1, 0] \cup [1, \infty)$



$[-1, 0] \cup [1, \infty)$

Page 58#13: Solve algebraically

• $2 - 5x - 3x^2 < 0$

$-3x^2 - 5x + 2 < 0$

$\begin{array}{r} -6 \\ \times -5 \\ \hline \end{array}$

$(x+1)(x-\frac{6}{-3})$

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

	$-\infty$	-2	$\frac{1}{3}$	∞
$x+2$	$-$	$\oplus$	$+$	$+$
$-3x+1$	$+$	$+$	$\oplus$	$-$
	$-$	$+$	$-$	

$x = \frac{1}{3} \text{ or } x = -2$

