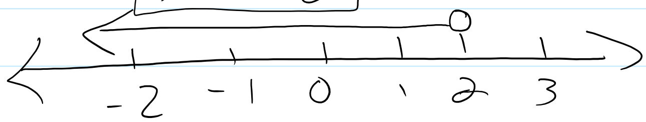
Solving Inequalities Algebraically

Tuesday, January 7, 2020 8:41 AM

Solve $3x + 2 < 8$

$$\begin{aligned} 3x + 2 &< 8 \\ -2 \quad & \quad -2 \\ \frac{3x}{3} &< \frac{6}{3} \\ \boxed{x < 2} \end{aligned}$$



Interval Notation

[when the number was included
$\leq$ or $\geq$

(when the number wasn't included
$<$ or $>$

$x < 2$ $(-\infty, 2)$

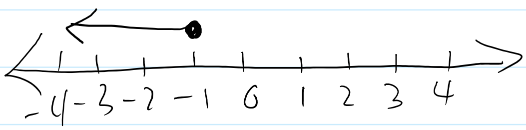
Solve $\frac{1}{2}x - 3 \geq 1$

$$\begin{aligned} \frac{1}{2}x - 3 &\geq 1 \\ +3 \quad & \quad +3 \\ 2\left(\frac{1}{2}x\right) &\geq (4)\,2 \\ x &\geq 8 \quad [8, \infty) \end{aligned}$$

Write the following in interval notation.

1. $-3 \leq x \leq 5$ $[-3, 5]$ closed interval

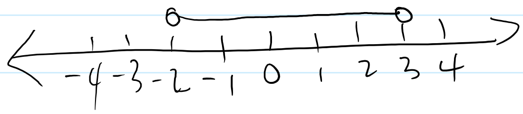
2. $x < 1$ or $x > 4$ $(-\infty, 1)$ or $(4, \infty)$ open interval

3. 

$(-\infty, -1]$ half open interval.

4. $(-2, 3)$

$-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$

(4)  $(-2, 3)$

Solve: $-2x + 3 \le -5$

$-3 \qquad -3$

$\frac{-2x}{-2} \le \frac{-8}{-2}$

$x \ge 4 \qquad [4, \infty)$

$2 < 4$

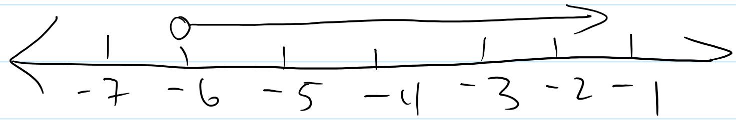
$-2 > -4$

Solve: $2x + 3 < 3x + 9$

$-3x - 3 \qquad -3x - 3$

$\frac{-x}{-1} < \frac{6}{-1}$

$x > -6 \qquad (-6, \infty)$



Solve $2x^2 + 7x - 1 \le 3$

$2x^2 + 7x - 4 \le 0$

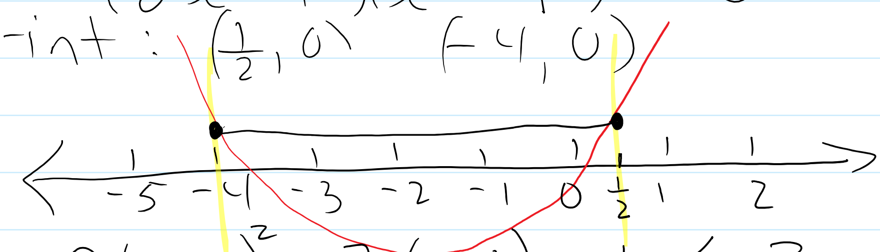
$(2x - 1)(x + 4) \le 0$

x-int: $(\frac{1}{2}, 0) \quad (-4, 0)$

$p = -8$

$s = 7$

$8, -1$



$= 0$

< 0

Test -5: $2(-5)^2 + 7(-5) - 1 \le 3$

$50 - 35 - 1$

$14 \le 3$ ✗

Test 0: $2(0)^2 + 7(0) - 1 \le 3$

$-1 \le 3$ ✓

Test 1: $2(1)^2 + 7(1) - 1 \le 3$

$8 \le 3$ ✗

Solution $-4 \le x \le \frac{1}{2}$ or $[-4, \frac{1}{2}]$

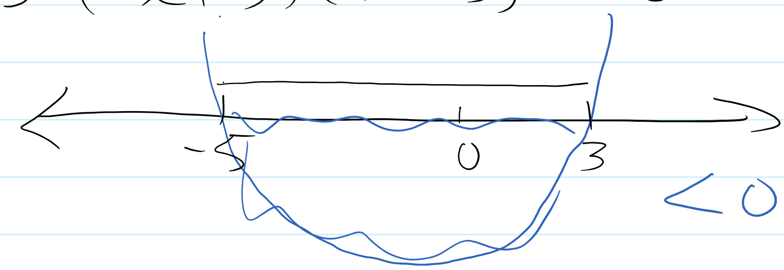
Find the x-intercepts (the critical points). Draw them on a # line. Test a number between the 2 x-int's in the inequality. If it makes the inequality true then that is the solution. If it makes the inequality false then the 2 outside sections are the solution.

Solve $3x^2 + 6x - 20 < 25$

$$3x^2 + 6x - 45 < 0$$

$$3(x^2 + 2x - 15) < 0$$

$$3(x+5)(x-3) < 0$$



Test 0: $3(0)^2 + 6(0) - 20 < 25$

$$-20 < 25 \checkmark$$

Solution $-5 < x < 3$ or $(-5, 3)$

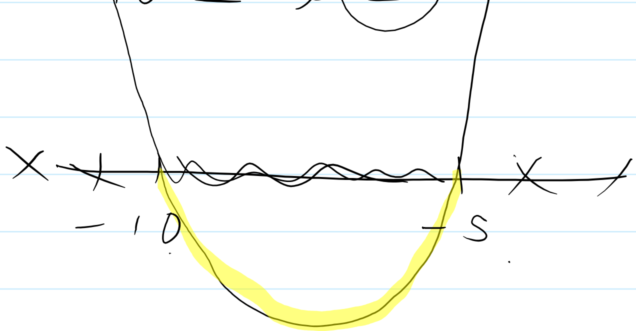
Pg 372-378 #3-13

5

$$2.50 + 1.25r \le 20.00$$

$10.95 + .65K \le 150$

(13) $-10 \le x \le -5$



$(x+10)(x+5)$

$x^2 + 15x + 50 \le 0$

$h(t) = -5t^2 + 15t + 2$

$-5t^2 + 15t + 2 > 8$

$-5t^2 + 15t - 6 > 0$