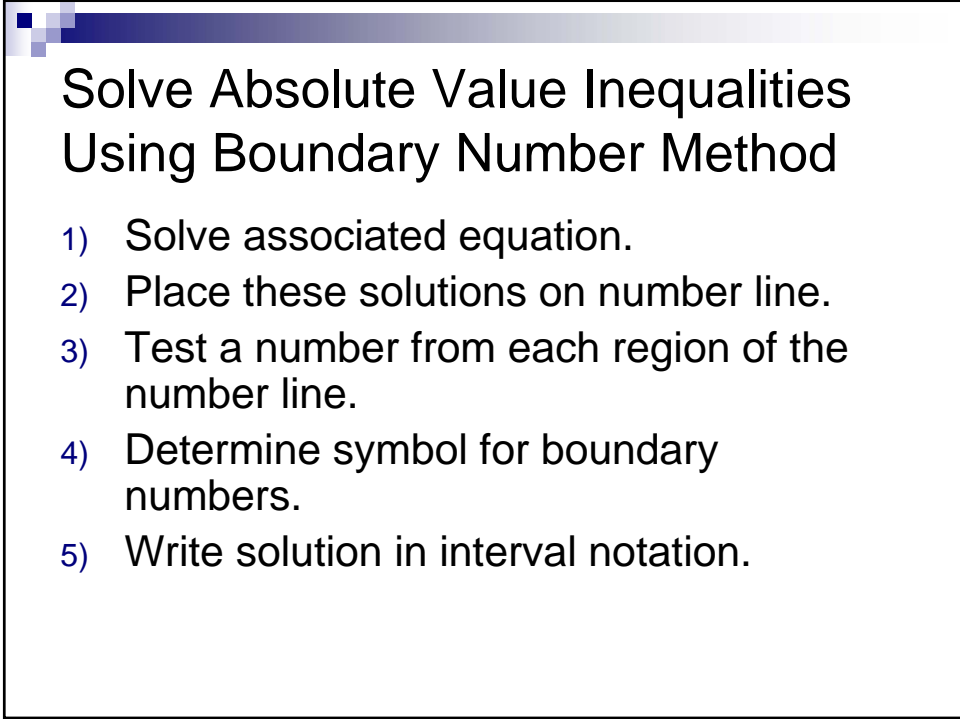




# Absolute Value Inequalities

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## Solve Absolute Value Inequalities Using Boundary Number Method

- 1) Solve associated equation.
- 2) Place these solutions on number line.
- 3) Test a number from each region of the number line.
- 4) Determine symbol for boundary numbers.
- 5) Write solution in interval notation.

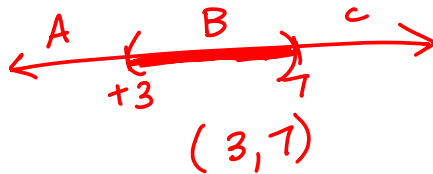
# Example

Solve  $|x - 5| < 2$

$$|x-5|=2$$

$$x-5=2 \text{ or } x-5=-2$$

$$x=7 \qquad x=3$$



A:  $x=-4$   
 $| -4-5 | < 2$   
 $| -9 | < 2$   
 $9 < 2$  F

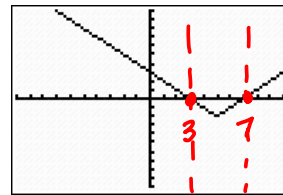
B:  $x=5$   
 $| 5-5 | < 2$   
 $| 0 | < 2$   
 $0 < 2$  T

C:  $x=8$   
 $| 8-5 | < 2$   
 $| 3 | < 2$   
 $3 < 2$  F

Use calculator to check  $|x-5| < 2$

```

Plot1 Plot2 Plot3
Y1=abs(X-5)-2
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
    
```



$|x-5|-2 < 0$   
 $y < 0$   
 below  
 x-axis

$|x-5|-2 < 0$

X	Y1	
2	1	
3	0	
4	-1	
5	-2	✓
6	-1	
7	0	
8	1	

X=8

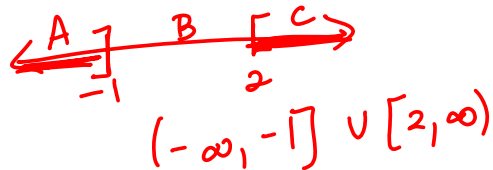


## Another Example

Solve  $|2x - 1| \geq 3$

$(2x-1) = 3$

$2x-1=3$  or  $2x-1=-3$   
 $2x=4$                        $2x=-2$   
 $x=2$                                $x=-1$



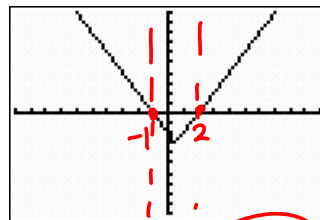
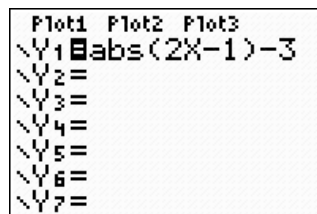
A:  $x = -2$   
 $|2(-2)-1| \geq 3$   
 $|-5| \geq 3$   
 $5 \geq 3 \checkmark$

B:  $x = 0$   
 $|2(0)-1| \geq 3$   
 $|-1| \geq 3$   
 $1 \geq 3 \times$

C:  $x = 3$   
 $|2(3)-1| \geq 3$   
 $|5| \geq 3 \checkmark$

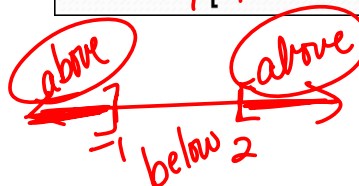
## Use calculator to check work

$|2x-1| \geq 3$      $|2x-1|-3 \geq 0$



X	Y1
-2	5
-1	3
0	-3
1	-3
2	3
3	5

X = -1



Solve

pos.  
 $|x + 2| > -3$

$$|x + 2| = -3$$

$\emptyset$



A:  $x=0$   $|0+2| > -3$   
 $(-\infty, \infty)$   $|2| > -3$   
 $2 > -3 \checkmark$

pos.  
 $|x + 2| < -3$

$|x + 2| = -3$   
no sol.

A



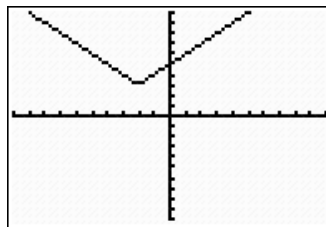
A:  $x=0$   $|0+2| < -3$   
 $2 < -3$   
 $\emptyset$  False

Check on calculator

$$|x + 2| < -3$$

$$|x + 2| > -3$$

Plot1	Plot2	Plot3
Y1	abs(X+2)+3	
Y2		
Y3		
Y4		
Y5		
Y6		
Y7		



X	Y1
1	4
2	5
3	6
4	7
5	8
6	9
7	10
8	11
9	12
10	13
11	14
12	15
13	16
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91	94
92	95
93	96
94	97
95	98
96	99
97	100
98	101
99	102
100	103

$|x + 2| + 3 < 0$  below  $\emptyset$

$|x + 2| + 3 > 0$  above  $(-\infty, \infty)$