

2.4 Inequalities with Absolute Value and Quadratic Functions

2.4.1 Exercises

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Exam 2, Thursday, 03/13/25

1.6-1.7, 2.1-2.4

NOVA will participate in the **Statewide Tornado Drill** on **Tuesday, March 11**, at **9:45 a.m.**

The Office of Emergency Management and Safety will utilize the hallway TV monitors, computer pop-ups and telephone intercom systems (in offices and classrooms) to announce the start of the Tornado Drill.

When the test Tornado Warning is sounded, move as quickly as possible to pre-identified severe weather shelter areas in your building. Once in the safe area, the recommended protective actions are to crouch down or sit on the floor and use your arms to protect your head from falling debris. If possible, take cover under a sturdy table.

Severe weather shelter areas are identified by signs like the one pictured below. (NOTE: shelter areas can be interior rooms without windows, restrooms or designated hallways and corridors marked with this sign).

The Statewide Tornado Drill will last for 10 minutes. At **9:55 a.m.**, you may resume normal activities. Announcements will be made using the college's emergency notification systems mentioned above and will announce the end of the drill; but not all severe weather shelters can receive the "all-clear" message. In all cases, please resume normal activity at 9:55 a.m. Also, please remember to follow the direction of building and floor wardens.

2.4.1 EXERCISES

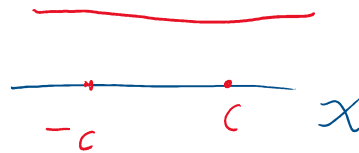
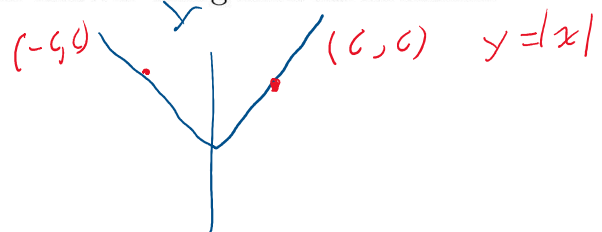
In Exercises 1 - 32, solve the inequality. Write your answer using interval notation.

3.  $|2x + 1| - 5 < 0$

$$|2x + 1| < 5$$

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

solve inequality for  $x$



$$|x| < c \text{ iff } -c < x < c$$

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

$$-6 < 2x < 4$$

$$-\frac{6}{2} < \frac{2x}{2} < \frac{4}{2}$$

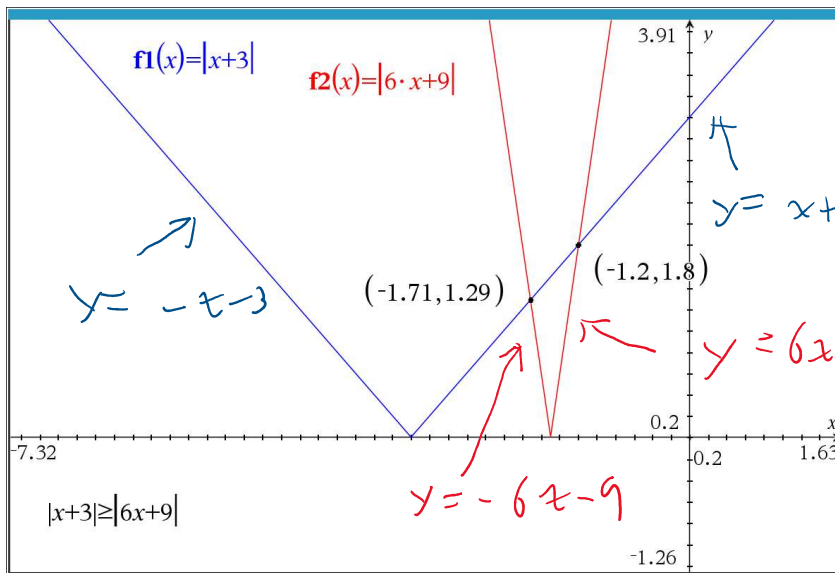
$$\boxed{-3 < x < 2}$$

$$\boxed{\{x \mid -3 < x < 2\}}$$

Triangle inequality

$$|a+b| \leq |a| + |b|$$

9.  $|x+3| \geq |6x+9|$



From graph solution is  $\approx [-1.71, -1.2]$

$$y = x + 3$$

$$y = 6x + 9$$

$$x + 3 = 6x + 9$$

$$-6 = 5x$$

$$\boxed{x = \frac{-6}{5}} \quad -6/5 = -1.2$$

$$y = x + 3$$

$$y = -6x - 9$$

$$x + 3 = -6x - 9$$

$$7x = -12$$

$$\boxed{x = \frac{-12}{7}} \quad -12/7 = -1.7143$$

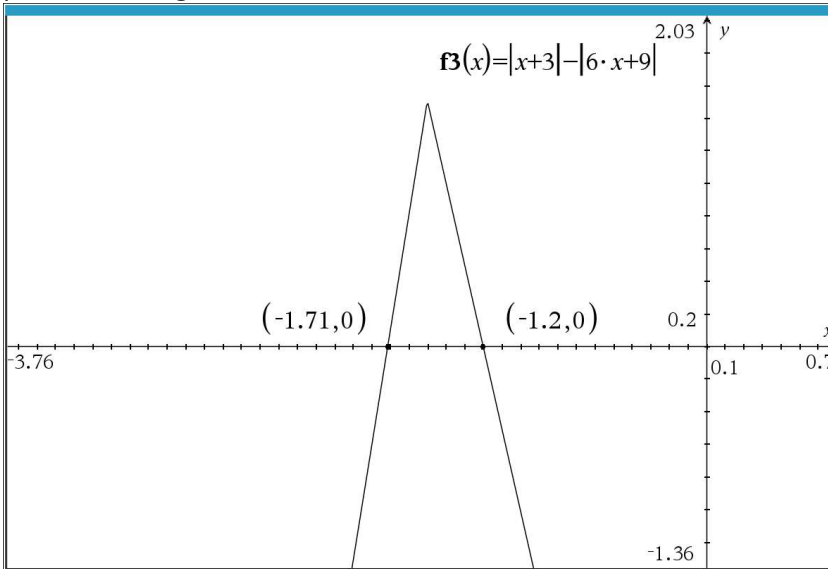
$$x = -\frac{6}{5}$$

$$-6/5 = -1.2$$

$$x = -\frac{12}{7}$$

$$-12/7 = -1.7143$$

Without the calculator graph, we would have to remove the absolute value signs by considering each case, i.e. where is  $x+3$  positive and where is it negative, matched with the cases of  $6x+9$  positive or negative.



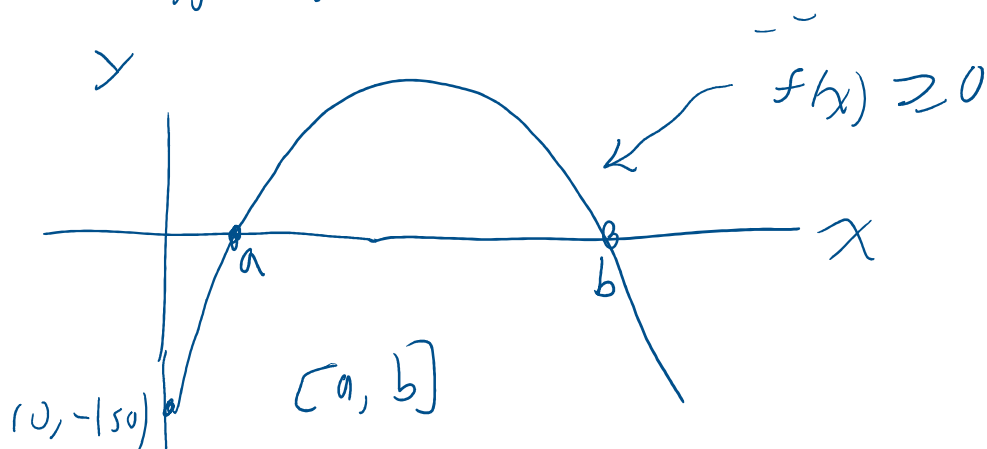
Here, we find the x-values by finding the zeros.

33. The profit, in dollars, made by selling  $x$  bottles of 100% All-Natural Certified Free-Trade Organic Sasquatch Tonic is given by  $P(x) = -x^2 + 25x - 100$ , for  $0 \leq x \leq 35$ . How many bottles of tonic must be sold to make at least \$50 in profit?

Find  $x$  such that  $P(x) \geq 50$

solve  $-x^2 + 25x - 100 \geq 50$

$$f(x) = -x^2 + 25x - 150 \geq 0$$



$$(0, -150) \quad | \quad [a, b] \quad |$$

$$\text{solve } -x^2 + 25x - 150 = 0$$

$$x^2 - 25x + 150 = 0$$

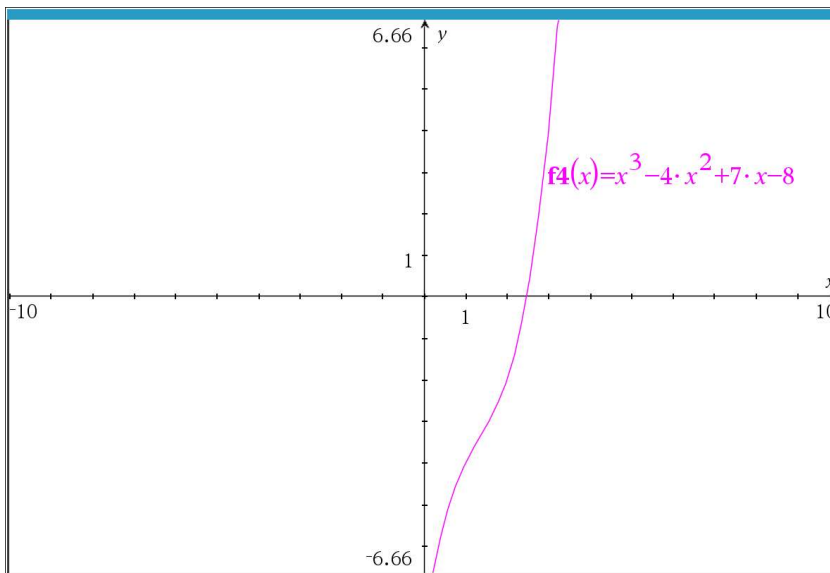
$$(x - 10)(x - 15) = 0$$

$$x = 10, 15$$

solution  $[10, 15]$

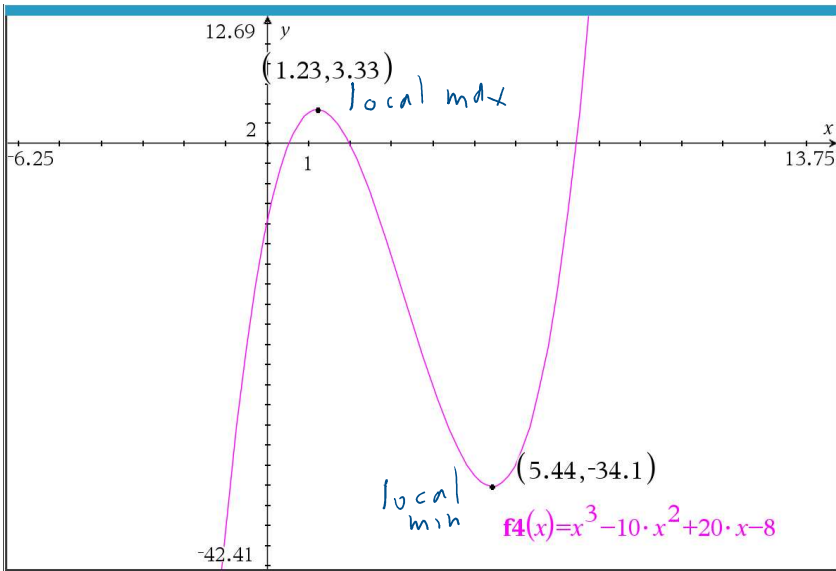
To make at least \$50 in profit, we must sell from 10 to 15 bottles of tonic, including those two values.

Where is  $f(x)$  increasing or decreasing or constant?



increasing  
on  $(-\infty, \infty)$

Where is the function increasing, decreasing, or constant?



increasing  $(-\infty, 1.23), (5.44, \infty)$   
 decreasing  $(1.23, 5.44)$