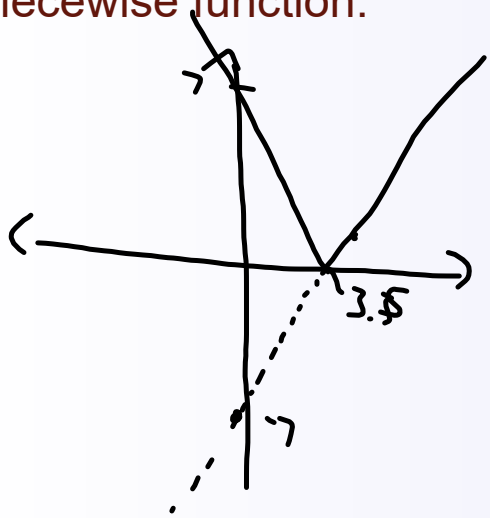
Express the absolute value function $y = |2x-7|$ as a piecewise function.



$2x-7=0$

$2x=7$

$x=3.5$

$$y=\begin{cases} 2x-7, & x\geq 3.5 \\ -(2x-7), & x<3.5 \end{cases}$$

Pre-Calculus 110
Unit 6: Absolute Value Functions and Equations

May 23, 2019: Day #5

1. Review and questions from...
p. 375-378 # 1 a, 2, 3, 4, 5ac, 6ace, 7ab, 8ace, 9, 10, 11ac, 12, 13, 15, 17, 19

Jan 29-9:28 AM

Curriculum Outcomes

AN1: Demonstrate an understanding of the absolute value of real numbers.

RF2. Graph and analyze absolute value functions (limited to linear and quadratic functions) to solve problems.

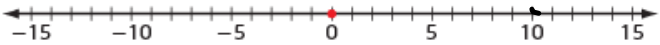
Jan 29-9:29 AM

7.3

Absolute Value Equations

Investigate Absolute Value Equations

1. Consider the absolute value equation $|x| = 10$.
2. Use the number line to geometrically solve the equation. How many solutions are there?



3. How many solutions are there for the equation $|x| = 15$? for $|x| = 5$? for $|x| = b$, $b \neq 0$? What are the solutions?
4. Make a conjecture about the number of solutions for an absolute value equation.
5. Solve the absolute value equation $|x| = 0$.

May 20-2:05 PM

Reflect and Respond

6. Is it possible to have an absolute value equation that has no solutions? Under what conditions would this happen?

7. Discuss how to use the following definition of absolute value to solve absolute value equations.

$$|x| = \begin{cases} x \text{ if } x \geq 0 \\ -x \text{ if } x < 0 \end{cases}$$

8. a) From the definition of absolute value in step 7, give a general rule for solving $|A| = b$, $b \geq 0$, for A, where A is an algebraic expression.

b) State a general rule for solving the equation $|A| = b$, $b < 0$, for A.

$|x| = 10$

$x = 10$ or $-x = 10$

$x = -10$

May 20-2:07 PM

Link the Ideas

Use the definition of absolute value when solving **absolute value equations** algebraically.

There are two cases to consider.

Case 1: The expression inside the absolute value symbol is positive or zero.

Case 2: The expression inside the absolute value symbol is negative.

absolute value equation

- an equation that includes the absolute value of an expression involving a variable

May 20-2:08 PM

Example 1

Solve an Absolute Value Equation

Solve $|x - 3| = 7$.

Show algebraic and graphical solutions.

Case (+)

$x - 3 = 7$

$x = 10$

Case 2 (-1)

$-(x-3) = 7$

$-x + 3 = 7$

$-x = 4$

$x = -4$

Your Turn

Solve $|6 - x| = 2$ graphically and algebraically.

(+) $6 - x = 2$

$-x = -4$

$x = 4$

(−) $-(6 - x) = 2$

$-6 + x = 2$

$x = 8$

May 20-2:11 PM

Example 2

Solve an Absolute Value Problem

A computerized process controls the amount of batter used to produce cookies in a factory. If the computer program sets the ideal mass before baking at 55 g but allows a tolerance of ±2.5 g, solve an absolute value equation for the maximum and minimum mass, m, of batter for cookies at this factory.

$$|x - 55| = 2.5$$

$x - 55 = 2.5$

$x = 57.5$ grams.

$-(x - 55) = 2.5$

$-x + 55 = 2.5$

$-x = -52.5$

$x = 52.5$ grams

Example 3

Absolute Value Equation With an Extraneous Solution

Solve $|2x - 5| = 5 - 3x$.

(+)

$2x - 5 = 5 - 3x$

$5x = 10$

$x = 2$

(−)

$-(2x - 5) = 5 - 3x$

$-2x + 5 = 5 - 3x$

$-2x + 3x = 5 - 5$

$x = 0$ ✓

May 20-2:15 PM

Example 4

Absolute Value Equation With No Solution

Solve $|3x - 4| + 12 = 9$.

$|3x-4| = 9-12$

$|3x-4| = -3$

no solution

May 20-2:16 PM

Example 5

Solve an Absolute Value Equation Involving a Quadratic Expression

Solve $|x^2 - 2x| = 1$.

Show graphically too!

(+) $x^2 - 2x = 1$

$x^2 - 2x - 1 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-1)}}{2(1)}$

$x = \frac{2 \pm \sqrt{8}}{2}$

$x = \frac{2 \pm 2\sqrt{2}}{2}$

$x = 1 \pm \sqrt{2}$

$x = 1 + 1.4$ $1 - 1.4$

2.4 -0.4

(−) $-(x^2 - 2x) = 1$

$-x^2 + 2x = 1$

$x^2 - 2x + 1 = 0$

$(x-1)(x-1) = 0$

$x = 1$

May 20-2:18 PM

Example 6

Solve an Absolute Value Equation Involving Linear and Quadratic Expressions

Verify Graphically

Solve $|x - 10| = x^2 - 10x$.

(+) $x-10 = x^2-10x$

$0 = x^2-11x+10$

$0 = (x-10)(x-1)$

$x = 10$ or ~~$x = 1$~~ ✓

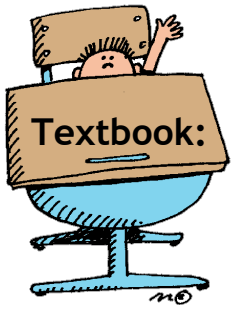
(−) $-(x-10) = x^2-10x$

$-x+10 = x^2-10x$

$0 = x^2-9x-10$

$0 = (x-10)(x+1)$

$x = 10$ ✓ or -1 ✓

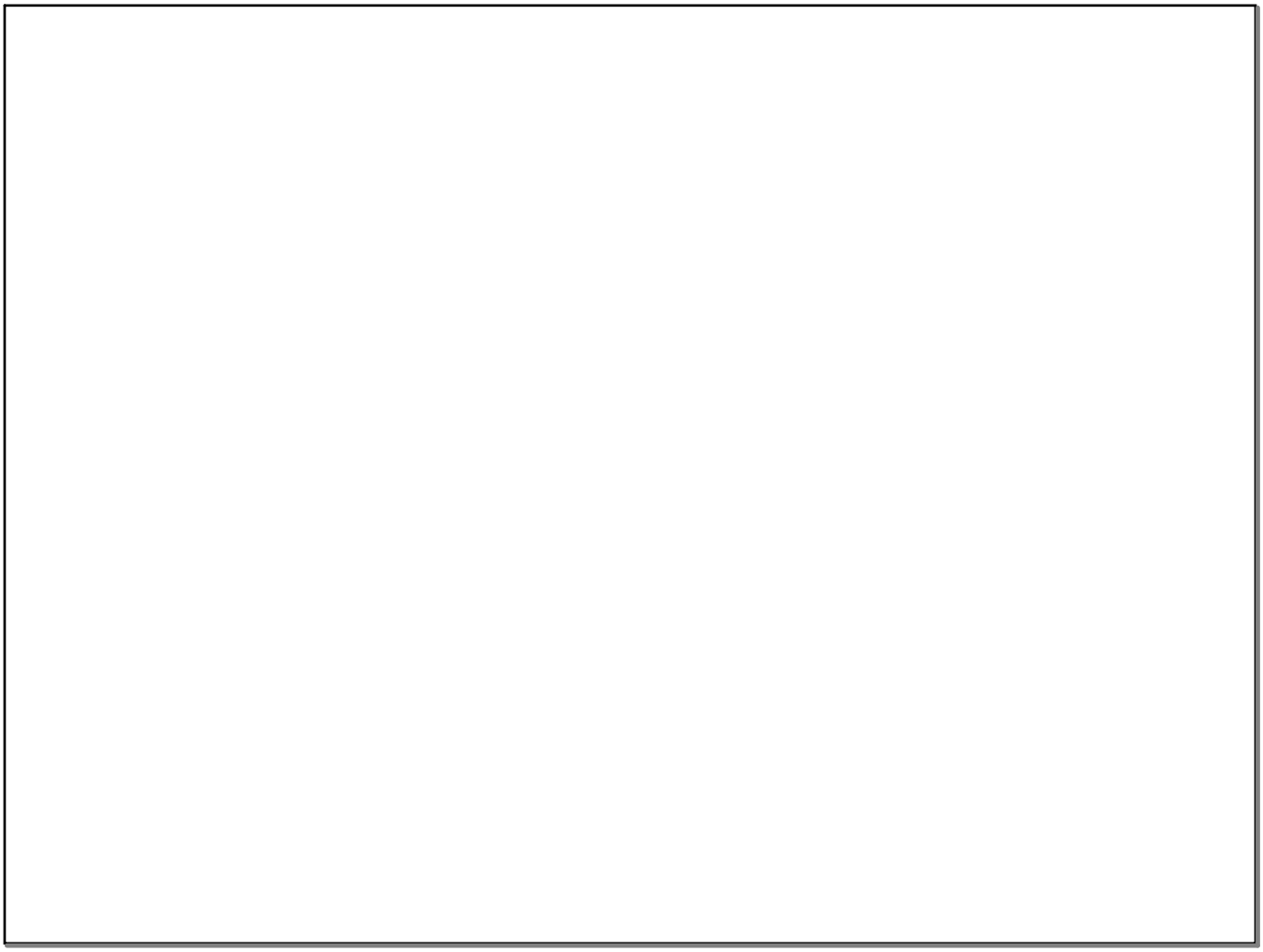


Minimum Preparation:

- p. 389-391

4, 5, 6ace, 7, 9, 15, 16, 20, 22, 23

Jan 29-10:15 AM



May 24-1:42 PM

Attachments

Standard Form Demor.GSP

Warm ups.notebook