Mini-Lecture 2.6

Absolute Value Equations

Learning Objectives:

1. Solve absolute value equations.

Examples:

1. Solve.

a) $|x|=6$ b) $|x|=-6$ c) $|3m|=9.3$ d) $6|x|-7=5$

e) $|x+4|=9$ f) $\left|\frac{x}{3}-2\right|=1$ g) $|5x|=0$ h) $|2n+3|+9=4$

i) $2|x-1|+15=20$ j) $|5x+9|=|x+4|$ k) $\left|\frac{1}{2}x+3\right|=\left|\frac{2}{3}x-1\right|$

Solve each equation for x.

l) $|x|=2$ m) $|3x|=15$ n) $|x|-3=-7$ o) $|4x-1|+9=11$

Teaching Notes:

- Refer students to the ***Absolute Value Equations*** and ***Solving Equations of the Form $|x| = a$*** charts in the text.

Answers: 1a) {6,-6}; b) ∅ ; c) {3.1,-3.1}; d) {-2,2}; e) {-13,5}; f) {3,9}; g) {0}; h) ∅ ; i) $\left\{-\frac{3}{2},\frac{7}{2}\right\}$*; j)* $\left\{-\frac{13}{6},-\frac{5}{4}\right\}$*; k)* $\left\{24,-\frac{12}{7}\right\}$*; l) {-2,2}; m) {5,-5}; n) ∅ ; o)* $\left\{-\frac{1}{4},\frac{3}{4}\right\}$

Mini-Lecture 2.7

Absolute Value Inequalities

Learning Objectives:

1. Solve absolute value inequalities of the form $|X| < a$.
2. Solve absolute value inequalities of the form $|X| > a$.

Examples:

1. Solve. Graph the solution set.

   a) $|x| \le 3$ b) $|x| < -3$ c) $|x+3| < 7$ d) $|x|+4 \le 8$

   e) $\left|\frac{x-3}{5}\right| < 1$ f) $|6-3x| < 4$

   Solve each inequality for x.

   g) $|x| < 4$ h) $\left|\frac{1}{3}x - 3\right| < 2$

2. Solve. Graph the solution set.

   a) $|x| \ge 3$ b) $|x| > -3$ c) $|x-5| \ge 8$ d) $|x|+6 > 7$

   e) $|9+4x|-3 > -2$ f) $\left|\frac{11+x}{7}\right| \ge 2$

   Solve each inequality for x.

   g) $|8+2x| \ge 0$ h) $|x-2| \ge 8$

Teaching Notes:

- Most students need to see the solutions to 1a-d) on a number line in order to visualize the solution set.

Answers: (graphing answers at end of mini-lectures) 1a) [-3,3]; b) $\varnothing$; c) (-10,4); d) [-4,4]; e) (-2,8); f) $\left(\frac{2}{3},\frac{10}{3}\right)$; g) (-4,4); h) (3,15); 2a) $(-\infty,-3] \cup [3,\infty)$; b) {all real numbers}; c) $(-\infty,-3] \cup [13,\infty)$; d) $(-\infty,-1) \cup (1,\infty)$; e) $\left(-\infty,-\frac{5}{2}\right) \cup (-2,\infty)$; f) $(-\infty,-25] \cup [3,\infty)$; g) {all real numbers}; h) $(-\infty,-6] \cup [10,\infty)$

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