Mini-Lecture 2.6

Absolute Value Equations and Inequalities

Learning Objectives:

1. Solve absolute value equations.
2. Solve absolute value inequalities involving < or ≤.
3. Solve absolute value inequalities involving > or ≥.
4. Solve applied problems involving absolute value.

Preparing for Absolute Value Equations and Inequalities:

Evaluate each expression:

i) $|-12|$ *ii*) $\left|\frac{0}{-10}\right|$ *iii*) $|0.4|$

EQUATIONS INVOLVING ABSOLUTE VALUE

If a is a positive real number and if u is any algebraic expression, then

$$|u| = a \quad \text{is equivalent to} \quad u = a \quad \text{or} \quad u = -a$$

Note: If $a = 0$, the equation $|u| = 0$ is equivalent to $u = 0$. If $a < 0$, the equation $|u| = a$ has no real solution.

Examples:

1. Solve each absolute value equation.

a) $|-2x - 5| = 9$

b) $3|4x + 1| - 2 = 10$

c)

EQUATIONS INVOLVING TWO ABSOLUTE VALUES

If u and v are any algebraic expression, then

$$|u| = |v| \quad \text{is equivalent to} \quad u = v \quad \text{or} \quad u = -v$$

$$\left|\frac{2}{3}x - 9\right| = |6x + 3|$$

2. Solve each absolute value inequality. Graph the solution set on a real number line.

a) $|x + 5| > 2$

b) $|2x - 3| \leq 7$

c) $|-5x - 8| + 12 < 4$

d) $2|x + 12| \geq 0$