Solution of an absolute value equation using Boolean Algebra

Theorem 1: $|x| = y \Leftrightarrow (y \geq 0 \wedge (x = y \vee -x = y))$

Theorem 2: $P \wedge (Q \vee R) \Leftrightarrow ((P \wedge Q) \vee (P \wedge R))$

$\{P \equiv -3\frac{1}{3} \leq x \; ; \; Q \equiv x = -3\}$

$\{Q \rightarrow P\}$

$|2x+5| = 3x+10$

$\Leftrightarrow (3x+10 \geq 0) \wedge (2x+5 = 3x+10 \vee -(2x+5) = 3x+10)$

$\Leftrightarrow (-3\frac{1}{3} \leq x) \wedge (x = -5 \vee x = -3)$

$\Leftrightarrow (-3\frac{1}{3} \leq x \wedge x = -5) \vee (-3\frac{1}{3} \leq x \wedge x = -3)$

$\Leftrightarrow F \vee (-3\frac{1}{3} \leq x \wedge x = -3)$

$\Leftrightarrow -3\frac{1}{3} \leq x \wedge x = -3$

$\Leftrightarrow P \wedge Q$

$\Leftrightarrow P \wedge Q \wedge (Q \rightarrow P)$

$\rightarrow Q$

$\rightarrow Q \wedge (Q \rightarrow P)$

$\rightarrow P \wedge Q$

$\rightarrow |2x+5| = 3x+10$

$\therefore |2x+5| = 3x+10 \Leftrightarrow x = -3$

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