Algebra - Non-Linear Simultaneous Equations

Solve algebraically these simultaneous equations.

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$y = x^2 - 2x + 3$ **[7]**

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Substitute for y

$3x + 2(x^2 - 2x + 3) = 7$

$3x + 2x^2 - 4x + 6 - 7 = 0$

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

$2x - 1 = -2$

$+1 - 2x$

$-1 + 2$

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

$x(2x+1) - 1(2x+1) = 0$

$(x-1)(2x+1) = 0$

Either $x - 1 = 0$ or $2x + 1 = 0$

$x = 1$ $2x = -1$

$x = -\frac{1}{2}$

Substitute for x

when $x = +1$

$3 + 2y = 7$

$2y = 7 - 3$

$2y = 4$

$y = \frac{4}{2}$

$y = 2$

when $x = -\frac{1}{2}$

$-\frac{3}{2} + 2y = 7$

$2y = 7 + \frac{3}{2}$

$2y = \frac{17}{2}$

$y = \frac{17}{4}$

$\begin{cases} x = 1 \\ y = 2 \end{cases}$

$\begin{cases} x = -\frac{1}{2} \\ y = \frac{17}{4} \end{cases}$ or $4\frac{1}{4}$