

ROMANIAN MATHEMATICAL MAGAZINE

Solve for real numbers:

$$(x+1)(x+2)^2(x+3) = 56$$

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$$(x+1)(x+3)(x+2)^2 = 56$$

$$(x^2 + 4x + 3)(x^2 + 4x + 4) - 56 = 0$$

Denote: $y = x^2 + 4x$

$$(y+3)(y+4) - 56 = 0$$

$$y^2 + 7y - 44 = 0$$

$$\Delta = 49 - 179 = 225$$

$$y_1 = \frac{-7-15}{2} = -11; y_2 = \frac{-7+15}{2} = 4$$

$$x^2 + 4x = -11 \Rightarrow x^2 + 4x + 11 = 0; \Delta < 0$$

$$x^2 + 4x = 4 \Rightarrow x^2 + 4x - 4 = 0$$

$$x_{1,2} = \frac{-4 \pm \sqrt{16+16}}{2} = \frac{-4 \pm 4\sqrt{2}}{2} = -2 \pm 2\sqrt{2}$$