The Weekly Rigor

No. 214

"A mathematician is a machine for turning coffee into theorems."

July 28, 2018

14 Problems in Using the Quadratic Formula (Part 1)

PROBLEMS

Use the Quadratic Formula to solve for x. Reduce all radical expressions to lowest factors (for example, $2\sqrt{3}$ instead of $\sqrt{12}$).

- 1. $x^2 5x 24 = 0$ 2. $x^2 + 3x - 10 = 0$
- 3. $4x^2 + 11x 20 = 0$ 4. $x^2 + 14x + 44 = 0$
- 5. $x^2 3x 3 = 0$ 6. $x^2 + 8x - 4 = 0$
- 7. $12x 9x^2 = -3$ 8. $9x^2 + 24x + 16 = 0$
- 9. $4x^2 + 4x = 7$ 10. $28x 49x^2 = 4$
- 11. $2x^2 = 4 x$ 12. $12x^2 + 32x = -5$
- 13. $2x^2 = x + 5$ 14. $-6x^2 + 12x = -1$

ANSWERS

1. $x = 8, x = -3$	2. $x = 2, x = -5$
3. $x = \frac{5}{4}, x = -4$	$4. \ x = -7 \pm \sqrt{5}$
5. $x = \frac{3}{2} \pm \frac{\sqrt{21}}{2}$	$6. x = -4 \pm 2\sqrt{5}$
7. $x = \frac{2}{3} \pm \frac{\sqrt{7}}{3}$	8. $x = -\frac{4}{3}$
9. $x = -\frac{1}{2} \pm \sqrt{2}$	10. $x = \frac{2}{7}$
11. $x = -\frac{1}{4} \pm \frac{\sqrt{33}}{4}$	12. $x = -\frac{1}{6}, x = -\frac{5}{2}$
13. $x = \frac{1}{4} \pm \frac{\sqrt{41}}{4}$	14. $x = 1 \pm \frac{\sqrt{42}}{6}$

SELECTED SOLUTIONS

3. Using the Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

with a = 4, b = 11, and c = -20, we have by substitution

$$x = \frac{-11 \pm \sqrt{11^2 - 4(4)(-20)}}{2(4)} = \frac{-11 \pm \sqrt{121 + 320}}{8} = \frac{-11 \pm \sqrt{441}}{8} = \frac{-11 \pm 21}{8} =$$

5. Using the Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

with a = 1, b = -3, and c = -3, we have by substitution

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-3)}}{2(1)} = \frac{3 \pm \sqrt{9 + 12}}{2} = \frac{3 \pm \sqrt{21}}{2} = \frac{3}{2} \pm \frac{\sqrt{21}}{2}$$

"Only he who never plays, never loses."

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