Solving Quadratic Equations by Factoring

June-25-18
10:39 AM

PRE-CALCULUS 11
QUADRATIC EQUATIONS
SOLVING QUADRATIC EQUATIONS BY FACTORING

A. Definitions

1. **factor:** terms or expressions that when multiplied form a product.

2. **quadratic equation:** an equation that can be written in the form: $ax^2 + bx + c = 0$.
   Where a, b and c are constants and $a \neq 0$.
   Quadratic equations usually have 2 answers.

B. Solving Quadratic Equations

Solve each equation and verify the solutions.

1) $(x-5)(x+2)=0$

$x - 5 = 0$ (+5) $\qquad x + 2 = 0$ (−2)

$x = 5 \qquad x = -2$

$\boxed{x = 5, -2}$

check

$(x-5)(x+2)=0$

$((5)-5)((5)+2)=0$

$(0)(7)=0$

$0 = 0$ ✓

$(x-5)(x+2)=0$

$((-2)-5)((-2)+2)=0$

$(-7)(0)=0$

$0 = 0$ ✓

2) $x^2 + 5x = 0$

Factor the expression

$x(x+5) = 0$

$x = 0 \qquad x + 5 = 0$ (−5)

$x = 0 \qquad x = -5$

$\boxed{x = 0, -5}$

check.

$x^2 + 5x = 0$

$(0)^2 + 5(0) = 0$

$0 + 0$

$0 = 0$ ✓

$x^2 + 5x = 0$

$(-5)^2 + 5(-5) = 0$

$25 - 25$

$0 = 0$ ✓

3) $x^2 - 2x - 8 = 0$

ac: -8; -4×2; $-4 + 2 = -2$; b

$(x-4)(x+2) = 0$

$x - 4 = 0$ (+4) $\qquad x + 2 = 0$ (−2)

$x = 4 \qquad x = -2.$

$\boxed{x = 4, -2.}$

check.

$x^2 - 2x - 8 = 0$

$(4)^2 - 2(4) - 8 = 0$

$16 - 8 - 8 = 0$

$0 = 0$ ✓

$x^2 - 2x - 8 = 0$

$(-2)^2 - 2(-2) - 8 = 0$

$4 + 4 - 8 = 0$

$0 = 0$ ✓

4) $4x^2 - 18 = 2x^2$

$-2x^2 \quad -2x^2$

$2x^2 - 18 = 0$

$2(x^2 - 9) = 0$

$2(x+3)(x-3) = 0$

$x + 3 = 0 \quad x - 3 = 0$

$-3 \quad +3$

$x = -3 \quad x = 3$

$x = -3, 3$ or $x = \pm 3$

check

$4x^2 - 18 = 2x^2$

$4(-3)^2 - 18 = 2(-3)^2$

$36 - 18 = 18$

$18 = 18$ ✓

$4x^2 - 18 = 2x^2$

$4(3)^2 - 18 = 2(3)^2$

$36 - 18 = 18$

$18 = 18$ ✓

5) $2x^2 + x - 6 = 0$

ac: -12; 4×-3; $b = 1$

$(2x^2 + 4x)(-3x - 6) = 0$

$2x(x+2) - 3(x+2) = 0$

$(2x-3)(x+2) = 0$

$2x - 3 = 0 \quad x + 2 = 0$

$+3 \quad +3 \quad -2$

$\frac{2}{2}x = \frac{3}{2}$

$x = \frac{3}{2} \quad x = -2.$

$x = \frac{3}{2}, -2$

check

$2x^2 + x - 6 = 0$

$2(\frac{3}{2})^2 + (\frac{3}{2}) - 6 = 0$

$0 = 0$ ✓

$2x^2 + x - 6 = 0$

$2(-2)^2 + (-2) - 6 = 0$

$0 = 0$ ✓

6) $6x^2 = 13x + 5$

$-13x \quad -13x \quad -5$

ac: -30; -15×2; $b = -13$

$6x^2 - 13x - 5 = 0$

$(x - \frac{15}{6})(x + \frac{2}{6}) = 0$

$(x - \frac{5}{2})(x + \frac{1}{3}) = 0$

$(2x-5)(3x+1) = 0$

$2x - 5 = 0 \quad 3x + 1 = 0$

$+5 \quad +5 \quad -1$

$\frac{2}{2}x = \frac{5}{2} \quad \frac{3}{3}x = -\frac{1}{3}$

$x = \frac{5}{2} \quad x = -\frac{1}{3}$

$x = \frac{5}{2}, -\frac{1}{3}$

check.

$6x^2 = 13x + 5$

$6(\frac{5}{2})^2 = 13(\frac{5}{2}) + 5$

$37\frac{1}{2} = 37\frac{1}{2}$ ✓

$6x^2 = 13x + 5$

$6(-\frac{1}{3})^2 = 13(-\frac{1}{3}) + 5$

$\frac{2}{3} = \frac{2}{3}$ ✓

Assignment: Pg. 190 #4 - 7