

6.2 Solve Quadratic Equations

A Identities Versus Equations

Identities are statements in Mathematics that are true regardless of the specific values of the variables involved. Example. $3x - 2x = x$ is an identity because is true for any x .

Equations are statements in Mathematics that are true for only some specific values of the variables involved. Example. $3x - 2x = 2$ is an equation because is true only if $x = 2$.

Example 1. Classify each of the following formulas as an identity or equation.

a) $x^2 - 4 = (x - 2)(x + 2)$

b) $x^2 - 4 = 0$

c) $x + y = y + x$

d) $x = 1$

B Important Fact

If $a \cdot b = 0$, then $a = 0$ or $b = 0$.

C Solution (Root) for an Equations

A number x that makes an equation a true statement is called *solution* or *root* of that equation. The collection of *all solutions* of an equation is called the *solution set* of that equation.

Example 2. Verify if the given number x , is or is not a solution of the given equation.

a) $x^2 + x = 0; x = 1$

b) $x^2 - 1 = 0; x = -1$

c) $x + 1 = 0; x = 0$

Example 3. For each of the following equations, find the solution set.

a) $2x + 4 = 0$

b) $x^2 = 9$

c) $2^x = 1$

D Solving an Equation

Solving an equation means finding the solution set (finding all numbers making the equation a true statement).

Example 4. Solve the following quadratic equations given in the factored form.

a) $x(x - 2) = 0$

b) $(x - 1)(x + 3) = 0$

c) $(x + 4)(x + 5) = 0$

E Solving a quadratic equation given in the standard form

In order to solve a quadratic equation given in the standard form, factor it first.

Example 5. Solve the following quadratic equations given in the standard form.

a) $x^2 - x - 12 = 0$

b) $x^2 = 4x$

c) $x^2 + 5x = 24$

d) $x^2 - 25 = 0$

e) $x^2 - 6x + 9 = 0$

f) $\frac{x^2}{6} + \frac{4}{3} = x$

Example 6. Solve the following quadratic equations. Hint: Factor first.

a) $4x^2 + 12x + 9 = 0$

b) $2x^2 - 7x - 15 = 0$

c) $12x^2 - 11x + 15 = 0$

Example 7. Solve the following equations.

a) $x^4 - 16 = 0$

b) $x^4 - 5x^2 + 4 = 0$

c) $x^4 - 18x^2 + 81 = 0$

Example 8. Solve the following quadratic equations.

a) $3(x - 1)^2 - 2 = (x - 4)(x + 1) + 7$

b) $(2x - 1)(x - 3) = (x + 2)(x + 3) - x(2x - 1) + 7$

Example 9. Find a quadratic equation with integral coefficients with the roots $-1/2$ and $2/3$.

Notes: Textbook Pages 274-279

Homework: Textbook Pages 279-281 # 1ab, 2ab, 3ab, 4ab, 5ab, 6ab, 11, 21 (optional)