

Exercises 7 Quadratic function and equations Quadratic function, quadratic equations

Objectives

- be able to determine the position of the vertex out of the vertex form of a quadratic function.
- be able to graph a quadratic function out of the vertex form.
- know and understand the relation between a quadratic function and a quadratic equation.
- be able to solve a quadratic equation by applying the quadratic formula.

Problems

7.1 Graph the quadratic functions below:

- a) f: \mathbb{R} \mathbb{R}
 x $y = f(x) = (x + 2)^2$
- b) f: \mathbb{R} \mathbb{R}
 x $y = f(x) = -3x^2$
- c) f: \mathbb{R} \mathbb{R}
 x $y = f(x) = 2x^2 - 1$
- d) f: \mathbb{R} \mathbb{R}
 x $y = f(x) = -(x - 3)^2 + 4$

7.2 Each quadratic equation can be converted into the following general form:

$$ax^2 + bx + c = 0 \quad (a \neq 0) \quad (*)$$

Determine the number of solutions that a quadratic equation can have.

Hints:

- Compare the left hand side of (*) with the general form of the formula of a quadratic function.
- Think of the graph of a quadratic function.

7.3 Solve the quadratic equations below. State the solution set for each equation.

- a) $x^2 + 10x + 24 = 0$ b) $x^2 + 22x + 121 = 0$
- c) $x^2 + 2x + 8 = 0$ d) $x^2 - 3x - 10 = 0$
- e) $x^2 - 14x + 49 = 0$ f) $x^2 - 8x + 25 = 0$
- g) $x^2 - 7x + 10 = 0$ h) $x^2 + 6x + 5 = 0$
- i) $x^2 - x - 20 = 0$

7.4 Solve the equations below. State the solution set for each equation.

- a) $9(x - 10) - x(x - 15) = x$ b) $3(x^2 + 2) - x(x + 9) = 11$
- c) $y^3 + 19 = (y + 4)^3$ d) $\frac{9x - 8}{4x + 7} = \frac{3x}{2x + 5}$
- e) $\frac{x^2}{x - 6} - \frac{6x}{6 - x} = 1$

Answers

- 7.1 a) vertex $V(-2|0)$, parabola opens upwards
b) vertex $V(0|0)$, parabola opens downwards
c) vertex $V(0|-1)$, parabola opens upwards
d) vertex $V(3|4)$, parabola opens downwards

7.2 ...

- 7.3 a) $S = \{-6, -4\}$
b) $S = \{-11\}$
c) $S = \{ \}$
d) $S = \{-2, 5\}$
e) $S = \{7\}$
f) $S = \{ \}$
g) $S = \{2, 5\}$
h) $S = \{-5, -1\}$
i) $S = \{-4, 5\}$

- 7.4 a) $S = \{5, 18\}$
b) $S = \{5, -1/2\}$
c) $S = \{-3/2, -5/2\}$
d) $S = \{2, -10/3\}$
e) $S = \{-2, -3\}$