

Chapter 2 Intercepts, Zeros, and Solutions

Section 2.1

Equation – A statement that two algebraic expressions are equal

Solutions – All values of the variable for which an equation is true

Linear equation in one variable x – An equation that can be written in the standard form $ax + b = 0$ where a and b are real numbers with $a \neq 0$

Extraneous – A solution that does not satisfy the original equation

Mathematical modeling – The process of transforming verbal descriptions into algebraic equations in order to solve a real-life problem

Formulas – Ready-made equations used in common types of geometric, scientific, and investment problems

Fitting a line to data – The process of finding a linear model to represent the relationship described by a scatter plot

Section 2.2

x -intercept – The point $(a, 0)$ is an x -intercept of the graph if it is a solution point of the equation

y -intercept – The point $(0, b)$ is a y -intercept of the graph if it is a solution point of the equation

Zero – A zero of the function $f(x)$ is a number a such that $f(a) = 0$

Point of intersection – An ordered pair that is a solution of two different equations

Section 2.3

Imaginary unit i – The number $\sqrt{-1} = i$, where $i^2 = -1$

Complex number- If a and b are real numbers, the number $a + bi$, where the number a is called the real part and the number bi is called the imaginary part, is a complex number written in standard form

Complex conjugates – A pair of complex numbers of the form $a + bi$ and $a - bi$

Fractal geometry – The study of figures that have the property of self-similarity

Complex plane – A coordinate system in which every point corresponds to a complex number $a + bi$

Imaginary axis – The vertical axis in the complex plane

Real axis – The horizontal axis in the complex plane

fractal – A figure that is self-similar

Mandelbrot Set – A fractal, named for the mathematician Benoit Mandelbrot, that is generated based on the behavior of the sequence of numbers $c, c^2 + c, (c^2 + c)^2 + c, [(c^2 + c)^2 + c]^2 + c, \dots$ which is determined by the value of the complex number c

Bounded – All elements in the sequence used to generate the Mandelbrot set that are less than some fixed number N

Unbounded – All elements in the sequence used to generate the Mandelbrot set that become infinitely large

Section 2.4

Quadratic equation in x – An equation that can be written in the general form $ax^2 + bx + c = 0$ where $a, b,$ and c are real numbers with $a \neq 0$.

Second-degree polynomial equation in x – Another name for a quadratic equation in x

Position equation – The general equation $s = -16t^2 + v_0t + s_0$ that gives the height of an object that is falling (or projected into the air)

Section 2.5

Solutions of an inequality – All values of the variable for which the inequality is true

Graph of an inequality – The set of all points on the real number line that represent the solution set of an inequality

Properties of inequalities – Properties (similar to the properties of equality) used to isolate the variable when solving a linear inequality in one variable

Equivalent inequalities – Two inequalities that have the same solution set

Linear inequality – An inequality in one variable (usually x) that can be written in the form $ax + b < 0$ or $ax + b > 0$, where a and b are real numbers with $a \neq 0$.

Double inequality – An inequality that represents two inequalities

Critical numbers – The x -values that make the polynomial in a polynomial inequality equal to zero

Test intervals – Open intervals along the real number line in which the polynomial has no sign changes