

Section 2-1

Sums and Differences of Polynomials

Objectives for Section 2-1

- to add polynomials
- to subtract polynomials

Sums and Differences of Polynomials

- monomial: a numeral, a variable, or an indicated product of numerals and variables
- coefficient: the numerical part of a variable monomial
- n th power of x : the product of n x factors. n is the exponent and x is the base
- degree of a monomial: the sum of all exponents of a monomial. constants have degree zero
- polynomial: a sum of monomials
- similar monomials: must have the exact same variables with the exact same exponents. differ only in their numerical coefficient.
- simple form: all similar (like) terms have been combined
- degree of a polynomial: the greatest of the degrees of its terms

Rules for Adding and Subtracting Polynomials

- Add the coefficients of similar terms in the polynomial
- Subtract the coefficients of each terms in one polynomial from the coefficients of the similar terms in the other polynomial

Section 2-2

Transforming Equations

Objectives for Section 2-2

- to identify the transformations necessary to simplify an open sentence
- to solve open sentences in one variable
- to isolate a given variable in a formula
- to prove theorems concerning transformations

Transforming Equations

- equivalent equations: equations with the same solution set
- Transformations Producing an Equivalent Equation
 - Substitute for either side of the given equation an expression equivalent to it.
 - Adding to or subtracting from each side of the given equation the same polynomial in any variable(s) appearing in the equation.
 - Multiplying or dividing each side of the given equation by the same nonzero number.

Properties of Equality

- Addition Property: $a + c = b + c$ or $c + a = c + b$
- Multiplication Property: $ac = bc$ or $ca = cb$
- Subtraction Property: $a - c = b - c$
- Division Property: $\frac{a}{c} = \frac{b}{c}$, provided $c \neq 0$

Section 2-3

Solving Problems Using Linear Equations

Objectives for Section 2-3

- to solve word problems involving a single variable

Problem Solving With Equations

- Steps for Solving Word Problems:
 - Read the problem carefully. Identify the question part of the problem and determine what number(s) is asked for as an answer(s). Set your variable(s) equal to this number(s).
 - Re-read the problem carefully and make a sketch if the problem describes an object or physical relationship. Write down and label any other numerical information given in the problem.
 - Slowly re-read the problem and translate the English phrases and sentences into algebraic expressions and open sentences.
 - Solve the equation(s) and find the required number(s).
 - Check your answer with the original statement of the problem and give your answer with the appropriate units of measurement.

Section 2-4

Properties of Order

Objectives for Section 2-4

- to identify true statements of order and to justify these statements with the appropriate property or axiom of order
- to solve single variable inequalities
- to justify statements of order
- to prove theorems of order

Properties of Order

- If a and b are real numbers then, $a < b$ (or $b > a$) if and only if there is a positive real number c such that $a + c = b$
- If a and b are real numbers, then one and only one of the following statements is true: $a > b$, $a = b$, $a < b$.
- If a and b are positive real numbers, then $a + b$ is a positive real number and ab is a positive real number; that is the positive real numbers are closed under addition and multiplication.
- If a , b , and c are real numbers, and if $a < b$ and $b < c$, then $a < c$.
- If a , b and c are real numbers, and if $a < b$, then $a + c < b + c$
- Let a , b and c be real numbers: If $a < b$ and c is positive, then $ac < bc$. If $a < b$ and c is negative, the $ac > bc$.

Transformations Producing an Equivalent Inequality

- Substituting for either side of the inequality and expression equivalent to that side.
- Adding to or subtracting from each side of the inequality the same polynomial in any variable(s) appearing in the inequality.
- Multiplying or dividing each side by the same positive number.
- Multiplying or dividing each side by the same negative number and reversing the direction of the inequality symbol.

Section 2-5

Compound Sentences

Objectives for Section 2-5

- to solve conjunctions and disjunctions
- to solve word problems involving statements of order, conjunctions and disjunctions

Compound Sentences

- disjunction: two mathematical sentences joined with the word “or” such that at least one of the sentences is true
- conjunction: two mathematical sentences either joined with the word “and” or written in the form $a < b < c$ such that both sentences are true

Section 2-6

Additional Properties of Order

Objectives for Section 2-6

- to prove theorems of order

Properties of Order

- For all real numbers a , if $a > 0$, then $-a < 0$; if $a < 0$, then $-a > 0$.
- If a is a nonzero real number, then $a^2 > 0$.
- For all nonzero real numbers a , if $a > 0$, then $\frac{1}{a} > 0$;
if $a < 0$, then $\frac{1}{a} < 0$.

Indirect Proof

- Assume that the conclusion of the theorem is false.
- Reason from this assumption until you obtain a statement contradicting the hypothesis, an axiom, or a previously proven theorem.
- Point out that the assumption must be incorrect, so that the conclusion of the theorem must be true.

Section 2-7

Absolute Value and Order

Objectives for Section 2-7

- to simplify statements involving absolute value
- to solve single variable open sentences involving absolute value
- to determine if statements involving absolute value are true or false for the set of real numbers and to provide counterexamples to prove a statement is false
- to prove theorems for absolute value

Absolute Value and Order

- If a is a real number, then $|a| = \begin{cases} a, & \text{if } a \geq 0, \\ -a, & \text{if } a < 0. \end{cases}$