

MATH 217 ESSENTIALS

2.1: Systems of Two Equations in Two Unknowns

Method of substitution
Method of elimination
Solving two linear equations in two unknowns graphically
Inconsistent system
Dependent or redundant system
Expressing solutions using a parameter
Examples 1, 2, 3, 4, 5, 6, 7

2.2: Using Matrices to Solve Systems of Equations

Definition of a matrix
Dimensions of a matrix
Row and column matrices
Augmented matrix
Row operations
Definition of a pivot
Gauss-Jordan reduction or Reduced Row Echelon Form (rref)
Examples 1, 2, 3, 4, 5, 6, 7

2.3: Applications of Linear Equations

Examples 1, 2, 3, 4

3.1: Matrix Addition and Scalar Multiplication

Matrix equality
Adding and subtracting matrices
The zero matrix
Multiplying a matrix by a number (scalar)
Transpose of a matrix
Matrix properties
Examples 1, 2, 3, 4

3.2: Matrix Multiplication

How to multiply matrices
When matrix multiplication is defined
The dimensions of the product
The identity matrix
Matrix multiplication is not commutative
Properties
Examples 1, 2, 3, 4, 5, 6

3.3: Matrix Inversion

Notation and definition of an inverse matrix
Singular or noninvertible matrix
Using an augmented matrix to find the inverse
The determinant of a 2x2 matrix
Formula for the inverse of a 2x2 matrix
Finding an inverse using your calculator
Solving matrix equations
Examples 1, 2, 3, 4

4.1: Graphing Linear Inequalities

How to graph a single linear inequality
Graphing simultaneous inequalities
Solution set or feasible region
Graphing on the calculator
Graphing $x \geq 0$ and $y \geq 0$
Corner points
Examples 1, 2, 3, 4

4.2 Solving Linear Programming Problems Graphically

The objective function
Bounded feasible regions and optimal solutions
Examples 1, 2, 3, 4, 5

6.1: Sets and Set Operations

Definition of a set
Notation and set-builder notation
Finite versus infinite
The empty or null set
Element of and not an element of
Subset and proper subset
Union and intersection, & and or
Disjoint sets
Universal set
Venn Diagrams
Complement of a set
Cartesian product of two sets
Examples 1, 2, 3, 4, 5

6.2: Cardinality

- Definition of cardinality
- Cardinality of a union
- Cardinality of a complement
- Cardinality of a Cartesian product
- Examples 1, 2, 3, 4, 5

- 6.3: The Addition and Multiplication Principles
 - Addition principle
 - Multiplication principle
 - Decision algorithm
 - Examples 1, 2, 3

- 6.4: Permutations and Combinations
 - Definition of a permutation
 - Definition of a combination
 - Factorial notation
 - Evaluating $0!$
 - Permutation of n choose r , notation
 - Combinations of n choose r , notation
 - Examples 1, 2, 3, 4, 5, 6, 7, 8

- 7.1: Sample Spaces and Events
 - Experiment
 - Outcome
 - Sample Space
 - Event, favorable outcomes, unfavorable outcomes
 - Complement, union, and intersection of events
 - Mutually exclusive events
 - Examples 1, 2, 3, 4, 5

- 7.2: Relative Frequency
 - Definition of relative frequency
 - Properties of relative frequency
 - Examples 1, 2

- 7.3: Probability and Probability Models
 - Mathematical probability
 - Experimental probability
 - Subjective probability
 - Properties of probability distributions

- Impossible events
- Probability of unions, intersections, and complements
- Addition principle
- Addition principle for mutually exclusive events
- Examples 1, 2, 3, 4, 5, 6

- 7.4: Counting Techniques
 - Examples 1, 2, 3, 4, 5

- 7.5: Conditional Probability and Independence
 - Formula for conditional probability
 - Visualizing conditional probability
 - Tables and conditional probability
 - Multiplication principle for conditional probability
 - Tree diagrams and conditional probability
 - Independent event versus mutually exclusive
 - Examples 1, 2, 3, 4, 5, 6

- 7.6: Baye's Theorem and Applications
 - Slide show
 - Examples 1, 2, 3

- 8.1: Random Variables and Distributions
 - Random variable
 - Discrete
 - Continuous
 - Finite
 - Probability distribution for a finite random variable
 - Examples 1, 2, 3, 4, 5

- 8.2: Bernoulli Trials and Binomial Random Variables
 - Bernoulli trial
 - Binomial random variable
 - Probability distribution of binomial random variables
 - Examples 1, 2

- 8.3: Measures of Central Tendency
 - Mean
 - Population mean
 - Sample mean

- Median
 - Mode
 - Expected value of a finite random variable
 - Expected value of a binomial random variable
 - Estimating the expected value from a sample
 - Examples 1, 2, 3, 4, 5
- 8.4: Measures of Dispersion
- Population standard deviation
 - Population variance
 - Sample standard deviation
 - Sample variance
 - Chebyshev's Rule
 - Empirical Rule
 - Variance and standard deviation of a finite random variable
 - Variance and standard deviation of a binomial random variable
 - Examples 1, 2, 3, 4, 5
- 8.5: Normal Distributions
- Probability density functions
 - The normal density function
 - The standard normal distribution
 - Calculating probabilities in the standard normal distribution
 - Calculation probabilities in any normal distribution
 - Normal approximation to the binomial distribution
- 15.1: Functions of Several Variables from the Numerical, Algebraic, and Graphical Viewpoints.
- Definition of a function of several variables
 - Linear functions
 - Tables of values
 - Graphs
 - Level curves
 - Slicing and dicing
 - Examples 1, 2, 3, 4, 5, 6, 7
- 15.2: Partial Derivatives
- Definition of a partial derivative
 - Geometric interpretation
 - Second-order partial derivatives
 - Mixed partials
 - Examples 1, 2, 3

15.3: Maxima and Minima

Relative maximum
Relative minimum
Saddle point
Interior points
Critical points
The second derivative test
Examples 1, 2
Deriving a regression line

15.4: Constrained Maxima and Minima and Applications

Substitution method
Lagrange multipliers
Examples 1, 2, 3, 4, 5