

MATH-0965: INTERMEDIATE ALGEBRA

Cuyahoga Community College

Viewing: MATH-0965 : Intermediate Algebra

Board of Trustees:

March 2021

Academic Term:

Fall 2021

Subject Code

MATH - Mathematics

Course Number:

0965

Title:

Intermediate Algebra

Catalog Description:

Second of two developmental mathematics courses. Topics include factoring; solving quadratic equations utilizing the methods of the zero product property, square root property, completing the square, and the quadratic formula; solving rational and radical equations, and systems of three linear equations in three variables; simplifying and evaluating rational, radical and exponential expressions; graphing quadratic and radical functions; introduction to exponential and logarithmic functions and their graphs; applications and activities to build problem-solving skills.

Credit Hour(s):

6

Lecture Hour(s):

6

Requisites

Prerequisite and Corequisite

MATH-0955 Beginning Algebra, or sufficient score on math placement test; or departmental approval.

MATH-0960 and MATH-0980 taken prior to Fall 2016 will also meet the prerequisite requirement for this course.

Please note: MATH-0965 Intermediate Algebra will NOT count as a college-level course (MATH-1270 or MATH-1280) due to the State of Ohio's new definition of a credit-bearing math course. Although credit is earned for 0 level courses, the credit does not apply to meet completion requirements of any certificate or degree at Cuyahoga Community College.

Outcomes

Course Outcome(s):

Simplify Rational Expressions and Solve Rational Equations.

Objective(s):

1. Define and identify rational expressions and functions.
2. Determine the domain of rational functions.
3. Evaluate rational functions at given numerical values.
4. Simplify or reduce rational expressions into lowest terms.
5. Determine the Least Common Denominator (LCD) for rational expressions.
6. Write equivalent rational expressions using the LCD.
7. Add, subtract, multiply and divide rational expressions.
8. Define and simplify complex rational expressions.
9. Solve equations involving rational expressions.
10. Solve applications involving rational functions.

Course Outcome(s):

Factor Polynomials and Solve Equations by Factoring.

Objective(s):

1. Identify and write polynomials in standard form.
2. Factor the greatest common factor (GCF) from polynomials.
3. Factor four-termed polynomials using the grouping method.
4. Factor trinomials with a leading coefficient of one.
5. Factor trinomials with leading coefficients not equal to one.
6. Factor the difference of two perfect squares.
7. Factor the sum and difference of two perfect cubes.
8. Factor trinomials which result in the square of a binomial sum or difference.
9. Identify prime polynomials.
10. Analyze the factoring process to factor any two, three or four-termed polynomial expression.
11. Utilize multiple factoring techniques to completely factor two, three, and four-termed polynomials.
12. Solve polynomial equations by factoring.
13. Solve application problems involving factoring polynomials.

Course Outcome(s):

Solve Systems of Linear Equations in Three Variables.

Objective(s):

1. Verify solutions of systems of linear equations in three variables.
2. Identify and solve consistent, inconsistent, and dependent systems in three variables.
3. Identify the graphical solutions to of linear equations in three variables as a unique solution, infinite solutions, and no solution.
4. Solve systems of equations in three variables using substitution and elimination methods.
5. Use systems of equations in three variables to solve application problems.

Course Outcome(s):

Define, Graph, Evaluate and Simplify Radical Expressions; Simplify Expressions Containing Rational Exponents, and Solve Equations Containing Rational Exponents or Radicals.

Objective(s):

1. Define and identify square roots, cube roots, nth roots, principal roots, conjugates, and roots that are not real.
2. Evaluate radical expressions involving any index, greater than or equal to two.
3. Use a calculator to approximate irrational radical values.
4. Determine the domain of radical functions.
5. Graph and evaluate radical functions.
6. Simplify radical expressions involving the nth root of a base a raised to the nth power where a the base is any real number and n a natural number greater than or equal to two.
7. Define and apply the properties of addition and subtraction of radicals.
8. Define and apply the product and quotient rules for radicals.
9. Multiply radical expressions containing more than one term.
10. Expand binomial squares containing radicals and find the product of conjugates containing radical terms.
11. Rationalize denominators containing one radical term of any index.
12. Rationalize denominators containing binomials with one or two square roots in the terms.
13. Solve radical equations containing one root of any index and two square roots.
14. Use the Rules of Exponents to simplify products, quotients, sums and differences involving rational exponents.
15. Define roots using rational exponents.
16. Write an expression involving a rational exponent as a radical.
17. Write an expression involving a radical using a rational exponent.
18. Use rational exponents to simplify an expression containing a root of a root.
19. Use rational exponents to reduce the index of a root.
20. Use rational exponents to multiply and divide radical expressions with different indices.
21. Solve equations containing rational exponents.
22. Identify radical equations and equations containing rational exponents that have no solutions or extraneous solutions.
23. Solve application problems involving radicals and rational exponents.

Course Outcome(s):

Solve Quadratic Equations and Graph Quadratic Functions.

Objective(s):

1. Define quadratic equations and functions.
2. Define "i" as equal to the square root of negative one.
3. Define "a + bi" as the standard form of a complex number.
4. Use the zero-product property, square root property, completing the square, and the quadratic formula to solve quadratic equations.
5. Analyze quadratic equations to determine the optimal method for solving.
6. Use the discriminant to determine the number and types of solutions to quadratic equations.
7. Write quadratic equations from given solutions.
8. Define and determine the vertex of a quadratic function as $(-b/2a, f(-b/2a))$.
9. Determine the maximum or minimum of a quadratic function using its vertex.
10. Determine the domain and range of a quadratic function.
11. Graph quadratic functions in standard form.
12. Solve equations that are quadratic in form.
13. Determine solutions to polynomial equations as an extension of quadratics.
14. Solve quadratic applications and equations including polynomial equations as an extension of quadratics.

Course Outcome(s):

Define and Evaluate Exponential and Basic Logarithmic Expressions and Graph Exponential and Basic Logarithmic Functions.

Objective(s):

1. Define exponential expressions and functions including base 10 and base e.
2. Determine the domain and range of exponential and logarithmic functions.
3. Differentiate between increasing and decreasing exponential functions.
4. Graph exponential and logarithmic functions.
5. Compare, contrast, and differentiate between linear, quadratic, and exponential, and logarithmic functions.
6. Solve applications involving exponential growth and decay.

Methods of Evaluation:

- A. Exams
- B. Quizzes
- C. Homework
- D. Projects
- E. In class/collaborative work
- F. Comprehensive final exam

Course Content Outline:

1. Factor polynomials and solve equations
 - a. Polynomials in standard form
 - b. Greatest Common Factor (GCF)
 - c. GCF method for four-termed polynomials
 - d. Binomial sums and differences, squared
 - e. Difference of two perfect squares
 - f. Trinomials with leading coefficients of 1
 - g. Trinomials with leading coefficients not equal to 1
 - h. Sum and difference of two cubes
 - i. Two, three and four-termed polynomials
 - j. Prime polynomials
 - k. Analytical process to factor any two, three, or four termed expression
 - l. Solve polynomial equations by factoring
 - m. Application problems
2. Rational expressions and equations

- a. Define rational expressions
- b. Domain and range of rational expressions
- c. Evaluate rational expressions
- d. Simplify rational expressions
- e. Least Common Denominator (LCD) of rational expressions
- f. Rewrite rational expressions with LCD
- g. Add and subtract rational expressions
- h. Multiply and divide rational expressions
- i. Complex rational expressions
- j. Solve equations
- k. Application problems
3. Systems of linear equations in three variables
 - a. Verify solutions
 - b. Consistent, inconsistent, and dependent systems
 - c. Visualize solutions in three-dimensional space
 - d. Method of Substitution
 - e. Method of Elimination
 - f. Application problems
4. Radical and rational exponent expressions and equations
 - a. Multiple root types
 - b. Evaluate radical expressions
 - c. Calculator approximation of roots
 - d. Domain and range
 - e. Graph
 - f. Simplify n th root of a^n
 - g. Properties of addition and subtraction
 - h. Product Rule for Radicals
 - i. Products of expressions with multiple terms
 - j. Special product rules with radicals
 - k. Rationalize one term denominators
 - l. Rationalize two termed denominators
 - m. Solve one root radical equations
 - n. Solve two root radical equations
 - o. Products, quotients, sums, differences with rational exponents
 - p. Define roots with rational exponents
 - q. Radicals to rational exponents
 - r. Rational exponents to radicals
 - s. Root of a root to rational exponents
 - t. Reduce index
 - u. Product and quotient of different indices and rational exponents
 - v. Equations with rational exponents
 - w. Equations with no solutions or infinite solutions
 - x. Application problems
5. Quadratic equations and graphs
 - a. Define quadratic equations and functions
 - b. Zero Product Property
 - c. Definition of " I "
 - d. Definition of complex number
 - e. Square Root Property
 - f. Method of Completing the Square
 - g. Quadratic Formula
 - h. Analyze to apply optimal method
 - i. Discriminant
 - j. Rational solutions and factorable quadratics
 - k. Solutions to quadratic equations
 - l. Vertex
 - m. Minimum and maximums

- n. Range and domain
 - o. Graph quadratic functions
 - p. Equations in quadratic form
 - q. Solve polynomials as extension of quadratics
 - r. Application problems
6. Exponential and logarithmic functions
- a. Define exponentials and logarithms
 - b. Domain and range
 - c. Increasing and decreasing
 - d. Graph
 - e. Differentiate linear, quadratic, exponentials, and logarithmic functions.
 - f. Application problems given domain values

Resources

Blitzer, Robert. *Introductory and Intermediate Algebra for College Students*. 6th ed. Boston, MA: Pearson Education, 2021.

Messersmith, Sherri, and Robert S. Feldman. *Beginning & Intermediate Algebra*. 5th ed. New York, NY: McGraw-Hill Education, 2020.

Rockswold, Gary, and Terry Kreiger. . *Beginning and Intermediate Algebra with Applications and Visualizations*. 4th ed. Boston, MA: Pearson Education, 2018.

Wright D. Franklin. *Introductory and Intermediate Algebra*. 6th ed. Mt. Pleasant, SC: Hawkes Learning Systems, 2012.

Resources Other

1. Software provided through publisher corresponding to textbook.
2. www.mathtv.com (<http://catalog.tri-c.edu/about:blank>)
3. www.khanacademy.com (<http://catalog.tri-c.edu/about:blank>)
4. www.desmos.com (<http://catalog.tri-c.edu/about:blank>)

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