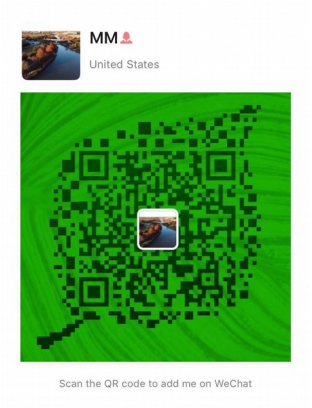
Algebra 2 Part 1, Fall 2022

(Part 2 will be offered in Spring 2023)



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TO REGISTER: **https://xumath.org**

WHEN, WHERE AND HOW MUCH?

Term: Aug 20, 2022 – Jan 4, 2023

In-Person (at QD) and Virtual (live zoom) Lecture: 11:00am-1:00pm (CT), Sat
(Live zoom only for Nov. 26-Thanksgiving, Dec. 24-Christmas, Dec. 31-New Year)

Video of Homework Solving: Posted on Wed after Homework due time

In-Person Address: QD Academy, 4100 Legacy Drive, Suite 404, Plano, TX 75024

Format:

- 20 2-hour lectures + 20 1-hour homework solving videos
- 20 homework assignments (to be graded) + 3 take-home exams (to be graded)

WHO TEACHES?

Dr. Sheng Xu: Associate professor of math at Southern Methodist University

- Received Ph.D. from Cornell and did post-doc at Princeton and Cornell;
- Taught 11 different math courses at SMU in past 15 years;
- Received Betty McKnight Speairs Endowed Teaching Excellence Award
- Recommended by K12 students and parents in anonymous testimonials on https://xumath.org/testimonial/
- Published an undergraduate textbook *Introduction to Scientific Computing with Matlab and Python Tutorials*, Taylor Francis, 2022

COURSE INFO

Syllabus, Sample Notes and Videos: **https://xumath.org**

Required Textbooks:

- **[1]** Customized notes by Prof. Xu with reference to various books (available before each class)
- **[2]** Ron Larson et al., *McDougal Littell Algebra 2*, 1st Edition: fundamental homework problems from this book

References:

- **[3]** R. Rusczyk and M. Crawford, The art of Problem Solving (AoPS) Intermediate Algebra: optional challenging problems mainly from this book
- **[4]** Ron Larson et al., *Precalculus With Limits: A Graphing Approach (Advanced Placement Version)*, 4th Edition
- **[5]** R.G. Brown et al., *Algebra and Trigonometry: Structure and Method*, Book 2

SCHEDULE

Part 1 (Fall 2022)

Unit 1: Fundamental Concepts

1. Numbers (e.g. real numbers); Arithmetic(e.g. order); Expressions (e.g. simplification)
2. Laws (e.g. laws of algebra); Equations and Inequalities (e.g. absolute value equations and inequalities)
3. Linear Systems (e.g. systems of three linear equations); Inequalities (e.g. systems of inequalities)
4. Functions (e.g. definition, evaluation, modeling, composition)
5. Functions (e.g. graphs)

Unit 2: Polynomial Functions, Expressions and Equations

1. Complex Numbers (e.g. complex plane, conjugate, arithmetic)
2. Quadratic Equations (e.g. completing the square, quadratic formula, discriminant, roots and coefficients)
3. Quadratic Functions and Inequalities (standard form, graphs, maxima and minima, inequalities)
4. Polynomial Division (e.g. long and synthetic divisions)
5. Polynomial Factorization (e.g. fundamental theorem of algebra, multivariable polynomials, inequalities)
6. Polynomial Roots (e.g. tests of rational roots, Vieta's formulas)

Unit 3: Analytic Geometry and Conics

1. Cartesian Coordinate System (e.g. graphs of equations, distance, midpoint, circles)
2. Parabolas (e.g. symmetry, shifting)
3. Circles and Ellipses (e.g. standard form, rotation)
4. Hyperbolas (e.g. asymptotes)

Part 2 (Spring 2023)

Unit 4: Rational Functions, Expressions and Equations

1. Rational Expressions (e.g. inverse variation, combination, simplification, partial fractions)
2. Rational Functions (e.g. graphs)
3. Rational Equations and Inequalities (e.g. table of intervals)

Unit 5: Radical Functions, Expressions and Equations

1. Radical Functions (e.g. roots, graphs)
2. Radical Expressions: (e.g. combination, simplification, complex numbers)
3. Radical Equations and Inequalities (e.g. danger of squaring)

Unit 6: Exponential and Logarithmic Functions and Equations

1. Exponential Functions (e.g. Euler's number e, graphs)
2. Logarithmic Functions (e.g. evaluation of logarithm, graphs)
3. Laws of Exponents and Logarithms (e.g. change of base)
4. Exponential and Logarithmic Equations (e.g. hyperbolic functions)

Unit 7: Sequences and Series

1. Arithmetic and Geometric Sequences (e.g. recurrence, general term)
2. Arithmetic and Geometric Series (e.g. partial sum, sum, convergence)
3. Counting (e.g. permutations, combinations)
4. Binomial Theorem (e.g. binomial coefficients)