

NEW YORK CITY COLLEGE OF TECHNOLOGY

The City University of New York

DEPARTMENT:	Mathematics
COURSE:	MAT 1275
TITLE:	College Algebra and Trigonometry
DESCRIPTION:	An intermediate and advanced algebra course. Topics include quadratic equations, systems of linear equations, exponential and logarithmic functions; topics from trigonometry, including identities, equations and solutions of triangles.
TEXTS:	<p>1) Intermediate Algebra 2e, by Lynn Marecek and Andrea Honeycutt Mathis, et al. OpenStax: https://openstax.org/details/books/intermediate-algebra-2e</p> <p>2) Algebra and Trigonometry by Jay Abramson, et al. OpenStax: https://openstax.org/details/books/algebra-and-trigonometry</p>
CREDITS:	4
PREREQUISITES:	MAT 1175 OR high school mathematics GPA of at least 70 and a successful completion of at a high school math course of least Algebra 1 OR NYS Regents Algebra 1 score of at least 75 OR NYS Regents Geometry score of at least 70. <p>Updated Spring 2021 by H. Carley, B. Kan, A. Masuda, and T. Tradler</p>

A. Testing/Assessment Guidelines:

The following exams should be scheduled:

1. A one-hour exam at the end of the First Quarter.
2. A one session exam at the end of the Second Quarter.
3. A one-hour exam at the end of the Third Quarter.
4. A one session Final Examination.

B. A scientific calculator is required.

COURSE INTENDED LEARNING OUTCOMES

Course Learning Outcomes	General education Learning Outcomes	Required Core: Mathematical and Quantitative Reasoning
Be able to simplify and manipulate linear, quadratic, radical, rational, exponential, logarithmic, and trigonometric expressions.	FS: Transfer; Be able to refer to prior knowledge or skill and can apply such to new situations.	Be able to use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
Be able to solve equations involving linear, quadratic, radical, rational, exponential, logarithmic, or trigonometric expressions as well as systems of linear/quadratic equations.	Foundation and skills: Curiosity: Explore a topic in depth yielding insight indicating interest.; QL: Interpretation, presentation: Be able to explain information presented in mathematical forms and to convert relevant information into various mathematical forms.	Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
Be able to graphically solve equations involving linear and quadratic expressions (including systems of such). Be able to use the unit circle to solve trigonometric equations. Understand the relationships between solutions to equations and their graphs.	FS: Transfer; Be able to refer to prior knowledge or skill and can apply such to new situations. QL: Calculation, Application/Analysis: Be able to carry out accurate calculations in order to solve a problem and to make judgements and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis.	Be able to use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
Be able to frame word problems in terms of mathematical equations and/or graphs. Be able to interpret the mathematical solutions in terms of the original language of the problem.	FS: Independence, reflection: Pursue knowledge beyond classroom requirements and/or show interest in independent educational experiences and reviews prior learning leading to clarification and broader perspectives.	Be able to represent quantitative problems expressed in natural language in a suitable mathematical format and apply mathematical methods to problems in other fields of study.
Be able to write solutions of mathematical problems involving linear, quadratic, radical, rational, or trigonometric expressions with full detailed explanations.	QL: Communication: Be able to express quantitative evidence in support of the argument or purpose of the work.	Be able to effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
Be able to recognize errors in proposed solutions and explain in written or oral form the nature of such an error as well as be able to correct it. Be able to estimate solutions of equations using graphs.	FS: Initiative: Complete required work and identifies and pursues additional expansion or knowledge or skills. QL: Assumption. Be able to make and evaluate important assumptions in estimation and modeling.	Be able to evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.

MAT 1275 - College Algebra and Trigonometry
Course Outline

Textbooks: 1) Intermediate Algebra 2e by Lynn Marecek and Andrea Honeycutt Mathis, et al. OpenStax (Classes 1-21)
2) Algebra and Trigonometry by Jay Abramson, et al. OpenStax (Classes 22-29)

WeBWorK: WeBWorK for MAT1275 uses the OpenLab Q&A site: Students will need an OpenLab account in order to post new questions.

Class	Lesson	Section	Homework	WeBWorK Set
1	Solve Systems of Equations with Three Variables Solve Systems of Equations Using Determinants (optional)	<u>4.4</u> : all examples <u>4.6</u> : exclude Ex. 4.52	<u>4.4</u> : 163-175 odd, 183, 187, 189-193 odd <u>4.6</u> : 233-235 odd, 241, 245, 249, 251, 257-261 odd, 265, 267	3 × 3-Systems
2	Polynomial Equations	<u>6.5</u> : exclude Ex. 6.50, 6.51, 6.55	<u>6.5</u> : 277-309 odd, 321-331 odd	ZeroProductProperty
3	Properties of Exponents and Scientific Notation Add and Subtract Rational Expressions	<u>5.2</u> : exclude Scientific Notation <u>7.2</u> : exclude Ex. 7.22, 7.23	<u>5.2</u> : 89, 103, 105, 111, 115, 125 <u>7.2</u> : 77-85 odd, 91, 99-103 odd, 107, 111, 119, 123, 125, 133, 135	IntegerExponents ReducingRationalExpressions AddRationalExpressions AddRationalExpressions2
4	Simplify Complex Rational Expressions	<u>7.3</u> : all examples	<u>7.3</u> : 151-185 odd, 188, 191, 193	ComplexFractions-Method1 ComplexFractions-Method2
5	Solve Rational Equations Applications with Rational Equations	<u>7.4</u> : exclude Ex. 7.40 <u>7.5</u> : Ex. 7.45, 7.46	<u>7.4</u> : 199-215 odd, 240, 246 <u>7.5</u> : 275-283 odd	FractionalEquations
6	Simplify Expressions with Roots Simplify Rational Exponents	<u>8.1</u> : Ex. 8.1, 8.2, 8.7a, 8.8, 8.10, 8.12 <u>8.3</u> : Ex. 8.26, 8.27a, 8.28, 8.29-8.33 all	<u>8.1</u> : 1-17 odd, 31, 34, 39, 47 <u>8.3</u> : 119, 123, 127-135 odd, 141, 145-153 odd, 159a	HigherRoots HigherRoots-Algebraic RationalExponents
7	Simplify Radical Expressions Add, Subtract, and Multiply Radical Expressions	<u>8.2</u> : Ex. 8.13, 8.14a, 8.15a, 8.16a, 8.17a, 8.20a, 8.21a, 8.22a, 8.23a, 8.24a, 8.25a <u>8.4</u> : Ex. 8.36a, 8.37a, 8.38a, 8.39a	<u>8.2</u> : 55-59 odd, 67a, 73a, 75a, 77a, 95, 103a <u>8.4</u> : 165a, 167a, 169a, 171a, 173a, 174a, 175a, 176a, 177a, 181, 182	SimplifyingRadicals AddSubtractRadicals
8	Multiply Radical Expressions	<u>8.4</u> : Ex. 8.40a, 8.41a, 8.42a, 8.43a, 8.44, 8.45a, 8.46	<u>8.4</u> : 183a, 184a, 185a, 186a, 187a, 189a, 191a, 193a, 195, 197a, 199a, 205-213 odd, and Simplify: (a) $(8 + \sqrt{a})(8 - \sqrt{a})$ (b) $(x + \sqrt{2})(x + \sqrt{6})$ (c) $(\sqrt{5} - \sqrt{y})^2$	MultiplyRadicals
9	Exam 1 Divide Radical Expressions	<u>8.5</u> : Ex. 8.47a, 8.48a, 8.49, 8.50, 8.53, 8.54, 8.55	<u>8.5</u> : 245a, 247a, 251a, 255, 259, 261, 271-279 odd	RationalizeDenominators
10	Solve Radical Equations	<u>8.6</u> : Ex. 8.56, 8.57, 8.58, 8.61, 8.62	<u>8.6</u> : 287, 289, 293-299 odd, 301-304 all, 317, and Solve for x : $\sqrt{x^2 + 5x - 7} = x + 4$.	RadicalEquations

Class	Lesson	Section	Homework	WeBWorK Set
11	Use the Complex Number System	<u>8.8</u> : Ex. 8.76-8.89 all	<u>8.8</u> : 409, 441, 443, 415-423 odd, 429-437 odd, 453-455 all, 457-467 odd, 469-473 all	ComplexNumbers
12	Solve Quadratic Equations Using the Square Root Property Solve Quadratic Equations by Completing the Square Solve Quadratic Equations Using the Quadratic Formula	<u>9.1</u> : all examples <u>9.2</u> : all examples <u>9.3</u> : derive the quadratic formula, exclude Ex. 9.26	<u>9.1</u> : 1-11 odd, 25-37 odd <u>9.2</u> : 71, 75-79 odd, 99-105 odd <u>9.3</u> : 115-131 odd, 145-149 odd	SquareRootProperty QuadraticFormula
13	Solve Applications of Quadratic Equations	<u>9.5</u> : exclude Ex. 9.40, 9.41	<u>9.5</u> : 195-217 odd	
14	Graph Quadratic Functions Using Properties Graph Quadratic Functions Using Transformations Parabolas (optional)	<u>9.6</u> : all examples <u>9.7</u> : exclude Ex. 9.63 <u>11.2</u> : Ex. 11.15	<u>9.6</u> : 229-233 odd, 237-243 odd, 253-261 odd, 277-283 odd <u>9.7</u> : 293-339 odd, 349, 351 <u>11.2</u> : 65, 67	ShiftingParabolas ParabolaLab ParabolaVertices-CtS ParabolaVertices-VertexFormula
15	Distance and Midpoint Formulas; Circles Perpendicular Bisectors	<u>11.1</u> : all examples	<u>11.1</u> : 1-5 odd, 13-37 odd, 41-47 odd Supplemental problems on perpendicular bisectors	DistanceFormula CircleLab Circles
16	Solve Systems of Nonlinear Equations	<u>11.5</u> : all examples	<u>11.5</u> : 189-195 odd, 201, 203, 209, 213-223 odd, 229, 231, 235, 237, and solve $\begin{cases} x^2 - y^2 = -4 \\ y = 2\sqrt{x} \end{cases}$	NonLinearSystems
17	Exam 2 (Midterm)			
18	Evaluate and Graph Exponential Functions	<u>10.2</u> : exclude Ex. 10.10-10.13	<u>10.2</u> : 95-101 all, 105, 107, 115-121 odd	ExponentialFunctions
19	Evaluate and Graph Logarithmic Functions	<u>10.3</u> : exclude Ex. 10.22, 10.23, 10.26, 10.27	<u>10.3</u> : 129-171 odd	LogarithmicFunctions
20	Use the Properties of Logarithms	<u>10.4</u> : all examples	<u>10.4</u> : 219-227 odd, 251-277 odd, 279, 281	LogarithmicProperties
21	Solve Exponential and Logarithmic Equations	<u>10.5</u> : all examples	<u>10.5</u> : 295-299 odd, 309-315 odd, 323, 347, 353	ExponentialEquations ExponentialEquations-Calc CompoundInterest
22	Angles Right Triangle Trigonometry	<u>7.1</u> : Ex. 1-8 all <u>7.2</u> : all examples	<u>7.1</u> : 7-21 odd, 27-39 odd, 51-57 odd <u>7.2</u> : 1, 3, 7, 10-16 all, 17-41 all, 43, 45, 47-55 odd	AngleMeasure-Radians SolvingRightTriangles SpecialTriangles TrigonometryRatios
23	Unit Circle The Other Trigonometric Functions	<u>7.3</u> : all examples <u>7.4</u> : exclude Ex. 4	<u>7.3</u> : 1-57 odd, 61-79 odd, 83, 87, 101, 103 <u>7.4</u> : 1-65 odd, 70, 71, 75	UnitCircle CoordinatePlaneTrig

Class	Lesson	Section	Homework	WeBWorK Set
24	Graphs of the Sine and Cosine Functions Graphs of the Other Trigonometric Functions (optional)	<u>8.1</u> : Ex. 1, 2, 8 <u>8.2</u> : Ex. 1, 3	<u>8.1</u> : 1, 5, 7-13 odd, 26, 27, 28, 30, 38, <u>8.2</u> : 22, 24	GraphingSineCosine
25	Inverse Trigonometric Functions	<u>8.3</u> : Ex. 1-4	<u>8.3</u> : 3, 9-21 odd, 22, 23, 53, 55, 57	SolvingRightTriangles- InverseTrig
26	Exam 3 Solving Trigonometric Equations with Identities	<u>9.1</u> : all examples	<u>9.1</u> : 4, 5, 7, 13, 29, 31, 32, 33, 40, 42	
27	Solving Trigonometric Equations	<u>9.5</u> : Ex. 1-5, 7-13, 17	<u>9.5</u> : 5-19 odd, 41-49 odd, 73-77 odd	TrigEquations
28	Non-right Triangles: Law of Sines	<u>10.1</u> : all examples	<u>10.1</u> : 3-51 odd, 59-77 odd	LawOfSines
29	Non-right Triangles: Law of Cosines	<u>10.2</u> : Ex. 1-4	<u>10.2</u> : 1, 7-25 odd, 33-53 odd, 63-73 odd	LawOfCosines
30	Final Exam			