Math 1050 Elementary Functions for Calculus

Fall 2018 Update for new edition of *Precalculus* by Cynthia Young, published by Wiley

Day	Topics covered	Objectives
1	Sections 0.1 and 0.2 Linear Equations Quadratic Equations	• Distinguish between types of equations and identify solving strategy. • Solve basic linear equations • Solve linear equations with distribution and variables on both sides • Solve linear equations with fractions • Solve application problems with linear equations • Solve quadratics with factoring (a = 1 and a != 1) and zero product property • Solve quadratics with square root method • Solve quadratics with completing the square • Solve quadratics with quadratic formula • Solve application problems with quadratics
2	Section 0.3 Other Types of Equations	• Solve rational equations (multiply by common denominator) • Solve radical equations (including cases where squaring both sides results in quadratic) • Solve equations in quadratic form (utilizing u-substitution and zero product property) • Solve factorable equations • Solve absolute value equations
3	Section 0.4 Inequalities	• Graphing inequalities and interval notation • Linear inequalities • Polynomial inequalities • Rational inequalities • Absolute value inequalities
4	Section 0.5 Graph Equations	• Cartesian plane • Distance formula (connect to Pythagorean Theorem) • Midpoint formula • Using intercepts to graph • Using symmetry to graph • Standard form of equation of circle (identifying radius and center) • General form of equation of circle (use completing the square to convert to standard form)

5	Section 0.6 Lines	• Calculating slope • Slope-intercept form • Point-slope form • Parallel and perpendicular lines

6	Section 1.1 Functions	• Definition of function (table, set of points, graph) • Function notation • Evaluating function notation • Finding domain of a function (no zero in denominator, no negative in square root)
7	Section 1.2 Graphs of Functions	• Shapes and tables of common (parent) functions • Intervals of increasing and decreasing • Average rate of change → difference quotient! • Evaluating piecewise functions
8	Section 1.3 Graphing Techniques and Transformations	• Graphing using transformations • $g(x) = a\,f(bx + c) + d$
9	Sections 1.4 and 1.5 Combining Functions One-to-one Functions Inverse Functions	• Adding, subtracting, multiplying, and dividing functions • Function compositions • Writing functions as compositions
10	Section 2.1 Quadratic Functions	• Graphs of quadratics • Direction parabola opens • Locating vertex (completing the square and $x = -\frac{b}{2a}$ formula) • Axis of symmetry • Minimum/maximum • Finding equation of parabola from graph
11	Section 2.2 & 2.3 Polynomials of Higher Degree Dividing Polynomials	• Real zeros • Multiplicity of zeros and how they look on graph • End behavior of polynomial • Sketching graphs using above information • Long division of polynomials • Synthetic division of polynomials (only when dividing by x – a)

12	Section 2.4 Real Zeros of a Polynomial	• Remainder and factor theorem • Rational zero theorem (RZT) • Using RZT and division to completely factor polynomials • Graph using above information
13	Section 2.5 Complex Zeros	

	The Fundamental Theorem of Algebra	
14	Section 2.6 Rational Functions	• Domain • Vertical asymptotes • Point discontinuities • Horizontal asymptotes • Slant asymptotes • Sketching graphs using key information
15	Review	
16	Exam 1: Chapters 0-2	

Unit 2

17	Section 3.1 Exponential Functions	• Evaluating exponential functions • Graphs of exponential functions • Base e
18	Section 3.2 Logarithmic Functions	• Evaluating logarithms • Common and natural logs • Graphs of logarithmic functions
19	Section 3.3 Properties of Logarithms	• Identity & Inverse properties • Product • Quotient • Power
20	Section 3.4 Exponential and Logarithmic Equations	• Exponents with like bases • Solving exponents with logarithms • Solving logarithms with exponential form • Logarithms with like bases
21	Section 3.5 Exponential and Logarithmic Models	• Population modeling • Half-life • Newton's Law of Cooling
22	Section 4.1 Angle Measure	• Degrees and radians • Angles in coordinate plane • Coterminal angles • If time: arc length, sector area
23	Section 4.2 Right Triangle Trigonometry	• Right triangle Ratios (SOHCAHTOA) • Reciprocal identities • Special right triangles (for lead-in to Unit Circle) • Solving right triangles (may allow calculators)

		○ Important to emphasize that $\sin^{-1} x$ is *not* the same as $\frac{1}{\sin(x)}$
24	Section 4.3 Trigonometric Functions of Angles	• Trig in coordinate plane • Algebraic signs of trig functions • Reference angles and reference right triangles • Evaluating trig in the coordinate plane
25	Section 4.4 Law of Sines	• Law of sines • Including ambiguous case! (two possible triangles from given information)
26	Section 4.5 Law of Cosines	• Law of cosines • Area of triangle using trig
27	Review	•
28	Exam 2: Chapters 3-4	•

Unit 3

29	Section 5.1 Trigonometric Functions: The Unit Circle Approach	Unit circle (tie back to special right triangles, reference angles, and reference triangles)
30	Section 5.2 Graphs of Sine and Cosine	• Graphing sine • Graphing cosine • Amplitude, period, phase shift
31	Section 5.3 Graphs of Other Trigonometric Functions	• Graphing tangent, cotangent • Graphing secant, cosecant
32	Section 6.1 Verifying Trigonometric Identities	• Reciprocal • Quotient • Cofunction • Pythagorean identities • Simplifying trig expressions • Verifying trig identities
33	Section 6.2 Sum and Difference Identities	• Sum and difference identities • Evaluating trig functions using sum/difference identities • Simplifying & verifying
34	Section 6.3 Double and Half Angle Identities	• Double and half angle identities • Evaluating trig functions using double/half • Simplifying & verifying
35	Section 6.4 Product to Sum and Sum to Product Identities	• Product to sum • Sum to product
36	Section 6.5	• Evaluating inverse trig

	Inverse Trigonometric Functions	
37	Section 6.6 Trigonometric Equations	• Basic trig equations • Trig equations involving multiples of angles (sin(2x) = ½) • Trig equations involving more initial algebra (2sin(x) + 1 = 0) • Trig equations involving factoring & ZPP • Trig equations involving identities
38	Review	
39	Exam 3: Chapters 5-6	
40	Sections 0.5, 9.1, 9.2 Types of Conics with Review of Completing the Square, Circles and Parabolas Parabolas should be reviewed based on earlier methods.	
41	Section 9.3 Ellipses	
42	Section 9.4 Hyperbolas	
43	Section 8.1 Systems of Linear Equations in Two Variables	• Solving with substitution • Solving with elimination
44	Section 9.5 Systems of Non-linear Equations	• Solving with substitution, mostly
45	Extra Day for Review or Catch Up	
46	Comprehensive Final Exam	