

M122 College Algebra: Topics to master

Chapter 1

1.1 – Rectangular Coordinates

- 1) Finding the distance between two points.
- 2) Finding the coordinates of the midpoint of a segment.
- 3) Drawing scattergraphs.

1.2 – Graphs of Equations

- 1) Opening a window to see the complete graph of an equation.
- 2) Finding the x- and y-intercepts of an equation.

1.3, 1.5 – Solving Equations

- 1) Solving equations analytically:
 - a) linear (with and without fractions)
 - b) quadratic by:
 - i. factoring
 - ii. square root property
 - ii. quadratic formula
 - c) rational (check for extraneous solutions)
 - d) radical
 - i. cube root
 - ii. square root (check for extraneous solutions)
 - e) absolute value (check for extraneous solutions)
- 2) Solving formulas.
- 3) Solving equations graphically:
 - a) x-intercept method
 - b) intersection of graphs method

1.4 – Applications: Word problems modeling linear and quadratic equations.

1.6 – Solving Inequalities

- 1) linear
- 2) combined
- 3) absolute value (both $<$ and $>$ inequalities)

1.7 – Lines

- 1) Finding the equation of the line going through a point and having a given slope
- 2) Finding the equation of the line given the slope and the y-intercept.
- 3) Finding the equation of the line going through two points.
- 4) Finding the equation of the line going through a point and being parallel/perpendicular to another line.
- 5) Finding the slope and y-intercept from an equation in the general form.
- 6) Word problems modeling the equation of the line.
 - a) Break Even Analysis
 - b) Supply and Demand

Chapter 2

2.1 – Functions

- 1) Determining whether a relation represents a function.
- 2) Determining whether a graph is that of a function.
- 3) Evaluating functions at:
 - a) numbers
 - b) expressions
- 4) Finding the domain, range, symmetry and intercepts from a graph.
- 5) Finding the domain of a function analytically:
 - a) for polynomial functions
 - b) for fractional functions.
 - c) for square root functions
 - d) for a mix of (b) and (c)
- 6) Word problems

2.2 – Linear Functions and Models

- 1) Straight Line Depreciation
- 2) Drawing a scattergraph, finding the line of best fit with the calculator, and using the equation to predict.

2.3 – Quadratic Functions

- 1) Quadratic functions:
 - a) finding the vertex analytically.
 - b) finding the intercepts
 - c) graphing by hand.
 - d) finding the range.
- 2) Word problems modeling quadratic functions.

2.4 – Quadratic Functions and Models

- 1) Word problems modeling optimizations of quadratic functions.

Chapter 3

3.1 - 3.3 – Properties of Functions, Library of Functions

- 1) Telling whether a graph is symmetric with respect to the x-axis, y-axis or neither.
- 2) Mastering elementary functions:
 - a) constant
 - b) linear
 - c) square
 - d) cube
 - e) square root
 - f) reciprocal
 - g) absolute value
 - h) greatest integer
- 3) Using a graph to determine
 - a) domain

- b) range
- c) intervals of increase, decrease, or constant
- d) even, odd, or neither
- e) intercepts

- 4) Evaluating and graphing piece-wise defined functions.
- 5) Determining whether a function defined by an equation is even, odd, or neither.
- 6) Word problems modeling optimization of functions.

3.4 – Graphing Techniques: Transformations

- 1) vertical shift
- 2) horizontal shift
- 3) vertical stretch
- 4) vertical compression
- 5) reflection about the x-axis
- 6) reflection about the y-axis

3.5 – Operations on functions

- 1) Operations with functions: a) addition/subtraction (and domain)
 - b) multiplication/division (and domain)
 - c) composition (and domain)
- 2) De-composition of functions.
- 3) Word problems modeling composition.

3.6 – Applications

- 1) Word problems: constructing functions

Chapter 4

4.1 – Power functions

- 1) Graphing transformations of power functions $y = x^n$ (with n odd, or even)
- 2) Word problems modeling power functions

4.2 – Polynomial functions

- 1) Recognizing polynomial functions
- 2) Writing the equation of a polynomial function of a given degree and given zeros
- 3) Determining the end behavior of a polynomial function.
- 4) Determining the number of turning points
- 5) Graphing polynomial functions and determining:
 - a) x-intercepts (for some functions do this analytically)
 - b) y-intercept
 - c) multiplicity of zeros
 - d) local extrema points
- 6) Solving polynomial equations
- 7) Cubic regression

4.3-4.4 – Rational functions

- 1) Determining
 - a) domain
 - b) vertical asymptote
 - c) horizontal asymptote
 - d) intercepts
 - e) graphing
- 2) Word problems modeling rational functions

4.5 – Polynomial and Rational Inequalities

- 1) Solving polynomial inequalities analytically
- 2) Solving rational inequalities analytically
- 3) Word problems modeling polynomial functions

Chapter 6

6.1 – One to one functions. Inverse functions

- 1) Given a function defined by an arrow graph determine whether the inverse is a function.
- 2) Given the graph of a function, determine whether it is one to one.
- 3) Given the graph of a function, graph its inverse
- 4) Given two functions, verify they are inverses by showing that the composition $= x$.
- 5) Given a function, find its inverse.

6.2 – Exponential Functions

- 1) Graphing transformations of exponential functions
- 2) Word problems modeling exponential functions

6.3 – Logarithmic Functions

- 1) Changing an exponential expression to an equivalent logarithmic expression
- 2) Changing a logarithmic expression to an equivalent exponential expression
- 3) Evaluating logarithms with and without the calculator
- 4) Finding the domain of logarithmic functions
- 5) Graphing transformations of logarithmic functions
- 6) Word problems modeling logarithmic functions

6.4 – Properties of Logarithms

- 1) Expanding by writing as a sum or difference of logarithms
- 2) Condensing by writing as a single logarithmic expression
- 3) Evaluating logarithms with the change of base formula
- 4) Graphing logarithmic functions with the calculator

6.5 – Logarithmic and Exponential Equations

- 1) Solving logarithmic equations
- 2) Solving exponential equations

6.6 — Compound Interest

- Word problems involving:
- a) simple interest
 - b) compound interest
 - c) compounding continuously
 - d) present value

6.7 — Growth and Decay

- Word problems modeling
- a) growth
 - b) decay
 - c) Newton's law of cooling
 - d) logistic models

6.8 — Exponential, Logarithmic, and Logistic curve fitting

- Finding the function that best fits the data:
- a) exponential
 - b) logarithmic
 - c) logistic