The Mathematics Survival Kit - Maple Edition

Version 3

Table of Contents

Introduction Introduction to the Maple Edition What's New in This Version?

Getting Started on Survival

How to Use This Book - Read This! How to Get an "A" in Math How to Get Extra Help

Operation Cooperation and Fraction Traction

BEDMAS (Order of Operations) Adding and Subtracting Fractions Multiplying and Dividing Fractions Operations with Decimals Ratio, Rate and Percent Complex Numbers

Factoring: A Product of Practice

Difference of Squares Difference of Cubes Factoring $a^n - b^n$ and $a^n + b^n$ Common Factors Factoring Easy Trinomials The Remainder and Factor Theorems for Polynomials

Pliable Polynomials

Multiplying Polynomials - FOIL Adding and Subtracting Polynomial Fractions Multiplying and Dividing Polynomial Fractions Polynomial Division

A Partial Look into Partial Fractions

Partial Fractions: Preliminaries Partial Fractions: Distinct Linear Factors Partial Fractions: Repeated Linear Factors Partial Fractions: Irreducible Quadratics

The Straight Goods on Lines and Planes

Finding the Equation of a Line Slope *m* and *y* intercept *b* Graphing a Straight Line Using $y = m \cdot x + b$ Distance between Two Points and Distance from a Point to a Line or Plane Visually Identifying Slopes of Lines Parallel and Perpendicular Lines Finding Tangent and Normal Lines to a Curve

A Few Lines on Linear Algebra

Solving a Linear Equation Solving Two Linear Equations Using Substitution Solving Two Linear Equations Using Row Reduction Solving Three Linear Equations Using Row Reduction Consistent, Inconsistent and Dependent Systems of Linear Equations

Giving the Third Degree to Second Degree Polynomials: Quadratics!

Solving Quadratic Equations Using the Quadratic Formula Factoring Quadratic Equations Using the Quadratic Formula Problems Involving the Sum and Product of the Roots of a Quadratic Equation The Graph of $y = a(x-b)^2 + c$ Completing the Square

Solving Inequalities with Less (<) Difficulty, Greater (>) Ease

Solving Linear Inequalities Solving Quadratic Inequalities Solving Inequalities with Two or More Factors Solving Rational Inequalities

Increasing the Magnitude of Your Absolute Value Knowledge

The Basics of Absolute Value Solving Absolute Value Equations Solving Easy Absolute Value Inequalities Solving Less Easy Absolute Value Inequalities

Getting to the Root of Square Roots

The Basics of Square Root and the Reason $\sqrt{x^2} = |x|$ Solving Equations Involving Square Roots Rationalizing Denominators that Have \sqrt{x}

Some Basic Graphs and Some Basics about Graphs

Graphs of Basic Quadratic Relations Basic $y = x^n$ Graphs, where $n \in N$ (Even and Odd Functions) Basic $y = x^{-n}$ Graphs, where $n \in N$ Basic $y = x^{-n}$ Graphs, where $n \in N$ Shifting or Rescaling a Given Graph Tests for Symmetry Graphing Polynomials without Calculus Vertical and Horizontal Asymptotes Slant Asymptotes Intersection of Two Curves The Greatest Integer (or Floor) Function Graphs with the Greatest Integer Function

The Survival Kit Logs Powerful Time with Exponents and Logarithms

Properties of Exponents Logarithms (Log Means "FIND THE EXPONENT!") Basic Exponential Graphs Basic Logarithmic Graphs Inverse Formulas for Exponents and Logarithms Solving Exponential Equations Solving Logarithmic Equations The Derivative of e^x and a^x The Derivative of $\ln(x)$ and $\log_a(x)$ Log Differentiation Part I

Log Differentiation Part II: The derivative of $y = f(x)^{g(x)}$

Integrals Yielding ln: $\int \frac{du}{\frac{dx}{u}} dx = \ln(|u|) + C$

Trawing Your Attention to Some Basic Geometry

A Degree of Knowledge About Angles The Pythagorean Theorem Similar Triangles Radian Measure of an Angle

Angling Right in on Trigonometry

Basic Trigonometric Ratios: SOH CAH TOA Using SOH CAH TOA to Find Missing Sides and Angles Angles in Standard Position **Related Angles in Standard Position** Trig Ratios for the $(30^{\circ}, 60^{\circ}, 90^{\circ})$ Triangle Trig Ratios for the $(45^{\circ}, 45^{\circ}, 90^{\circ})$ Triangle Trig Ratios for 30° , 45° , 60° , 90° , 120° , and More - A Table! Trig Ratios for 30° , 45° , 60° , 90° , 120° , and More - A (Fabulous) Picture!! **Basic Trigonometric Graphs** The Circle Definition of Sine and Cosine Solving the Trig Equation sin(x) = cSolving the Trig Equation $\cos(x) = c$ The Sine Law The Cosine Law Commonly Used Trigonometric Formulas Including Derivatives and Integrals Basic Inverse Trigonometric Graphs

A Straightforward Approach to Limits

Easy Limits: "No Problem" Problems "0/0" Limits One-sided Limits Limits which Approach ∞ Limits at Infinity An " $\infty - \infty$ " Limit: $\lim_{x \to \infty} (\sqrt{x^2 - 8 \cdot x} - x)$ Variations on $\lim_{\theta \to 0} \left(\frac{\sin(\theta)}{\theta}\right) = 1$ L'Hôpital's Rule L'Hôpital's Rule Disguised: Converting IFs to Fractions

Continuity (There's a Hole in the Function, Dear Liza, Dear Liza)

Domain (Food for a Function!) Composite Functions Continuity and Discontinuity at a Point Continuous Functions (Intervals of Continuity) Continuity and Branch Functions Essential versus Removable Discontinuities

Derivatives or Going on a Tangent about Slopes

Finding the Derivative from the Definition Differentiable Functions (Intervals of Differentiability) Differentiability and Branch Functions Critical Numbers Min and Max Points from the First Derivative Graphing and Interpreting y versus y' versus y" Graph Sketching with Calculus Graph Sketching with Calculus: Vertical Tangent! Estimating Using the Differential Rolle's Theorem The Mean Value Theorem

Derivative Rules Rule

Derivatives: The Product Rule Derivatives: The Chain Rule Derivatives: The Quotient Rule Derivatives: Implicit Differentiation Derivatives: Implicit Differentiation Second Derivative

Integrating Your Knowledge about the Anti-Derivative

Easy Integrals/Anti-Derivatives Easy Integrals that Need a Little Tweaking The Chain Rule In Reverse (CRIR): No Adjustments Needed! CRIR: Adjustments Needed BUT Don't Use Substitution! CRIR: Adjustments Needed and Using Substitution Substitution when the CRIR Won't Work CRIR: Products of Trig Functions Integration by Parts: The Basic Examples Integration by Parts: Circular Integration By Parts Integration by Parts: The Tan-Sec Connection Integration by Trigonometric Substitution: Sin Integration by Trigonometric Substitution: Tan Integration by Trigonometric Substitution: Sec Integration Using Partial Fractions Definite Integrals - Area Problems Definite Integrals Using Substitution Improper Integrals - Functions with a Discontinuity Improper Integrals - Infinite Limits of Integration The Derivative of an Integral Differential Equations - Separation of Variables

Inverse Functions: Now that's a Switch!

Finding the Inverse of a Function Derivatives of Inverse Functions

Parametric Equations: Making Relations Functional

Parametric Equations Derivatives from Parametric Equations Higher Derivatives from Parametric Equations

Warming Up to Polar Coordinates

Polar Coordinates Polar to Rectangular Coordinates; Rectangular to Polar Equations Rectangular to Polar Coordinates; Polar to Rectangular Equations

Going to Any Lengths to Give You New Direction with Vectors

(Very) Basic Vectors The Dot or Scalar or Inner Product of Two Vectors The Projection of One Vector on Another The Vector or Cross Product of Two Vectors The Vector Equation of a Line The Vector Equation of a Plane The Scalar Equation of a Plane: Ax + By + Cz = DIntersection of Two Lines in \mathbb{R}^3 : Parallel/Coincident Case Intersection of Two Lines in \mathbb{R}^3 : Non-Parallel/Non-Coincident Case Intersection of Three Planes: Parallel/Coincident Case Intersection of Three Planes: Non-Parallel/Non-Coincident Case

A Few Terms in Sequences and Series and a Sampling of Statistics

Summation Notation and Common SUM= \sum Formulas

Arithmetic and Geometric Sequences and Series Combinations and Permutations: Choosing and Arranging Elementary Probability Mean, Median, Mode and Standard Deviation The Binomial Theorem Proof by Induction

End Game

Feedback Form About the Author Index