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Precalculus mathematics for calculus

1. Fundamentals 2. Functions 3. Polynomial and Rational Functions 4. Exponential and Logarithmic Functions 5. Trigonometric Functions: Unit Circle Approach 6. Trigonometric Functions: Right Triangle Approach 7. Analytical Trigonometry 8. Polar Coordinates, Parametric Equations, and Vectors 9. Systems of Equations and Inequalities 10. Conic Sections 11. Sequences and Series 12. Limits: A Preview of Calculus APPENDIX A: Geometry Review APPENDIX B: Calculations and Significant Figures (available on website) APPENDIX C: Graphing with a Graphing Calculator (available on website) APPENDIX D: Using the TI-83/84 Graphing Calculator (available on website) Additional Topics: Vectors in Three-Dimensions (available on website) James Stewart The late James Stewart received his M.S. from Stanford University and his Ph.D. from the University of Toronto. He conducted research at the University of London and was influenced by the famous mathematician George Polya at Stanford University. Dr. Stewart most recently served as a professor of mathematics at McMaster University, and his research focused on harmonic analysis. Dr. Stewart authored a best-selling calculus textbook series, including CALCULUS, CALCULUS: EARLY TRANSCENDENTALS and CALCULUS: CONCEPTS AND CONTEXTS as well as a series of successful precalculus texts. Lothar Redlin The late Lothar Redlin grew up on Vancouver Island, received a Bachelor of Science degree from the University of Victoria, and a Ph.D. from McMaster University in 1978. He subsequently did research and taught at the University of Washington, the University of Waterloo, and California State University, Long Beach. He was most recently Professor of Mathematics at The Pennsylvania State University, Abington Campus. His research field was topology. Saleem Watson Saleem Watson received his Bachelor of Science degree from Andrews University in Michigan. He did graduate studies at Dalhousie University and McMaster University, where he received his Ph.D. in 1978. He subsequently did research at the Mathematics Institute of the University of Warsaw in Poland. He also taught at The Pennsylvania State University. He is currently Professor of Mathematics at California State University, Long Beach. His research field is functional analysis. Watson is a co-author on Stewart's best-selling Calculus franchise. NEW EXERCISES HELP STUDENTS DEVELOP IMPORTANT PROBLEMSOLVING SKILLS: New Problem-Solving exercises in most sections highlight and apply a specific problem-solving principle from the prologue. More than 20% of the overall exercises are new to this edition. NEW REVIEW MATERIAL REINFORCES STUDENT UNDERSTANDING: Updated, effective review material at the end of most chapters now includes a matching exercise to reinforce the fundamental relationship between graphs and equations. This important review also includes a summary of properties and formulas. In addition, a Concept Check provides a step-by-step review of all of the main concepts and applications from the chapter. NEW DISCOVERY PROJECTS GUIDE STUDENTS IN APPLYING THE CONCEPTS THEY'VE MASTERED: Several new Discovery Projects in this edition feature applications or extensions of the concepts that students have just studied in the text. Discover/Discuss/Prove/Write problems at the end of every section encourage students to develop and strengthen their conceptual, critical-thinking and writing skills. NEW REMEDIAL SUPPORT PREPARES STUDENTS FOR SUCCESS: Revisions throughout Chapter 1 review fundamentals while WebAssign digital resources provide prerequisite support to address readiness gaps, including the College Math Readiness Bootcamp and Just-in-Time review exercises. This edition also offers an expanded Geometry Review appendix that now highlights main concepts from geometry used in this edition, including congruence, similarity, the Pythagorean Theorem, parallel lines and circles. NEW EXPANDED PROBLEMS IN WEBASSIGN INCLUDE MULTIPLE PARTS TO ENSURE UNDERSTANDING: This edition's new online Expanded Problems take understanding well beyond the basic exercises. These problems ask students to show the specific steps of their work or to explain the reasoning behind the answers they've provided. NEW CHAPTER UNITES KEY TOPICS: The new Chapter 8, "Polar Coordinates, Parametric Equations, and Vectors," unites the topics under the theme of describing curves and motion in a coordinate plane. The applications in the chapter demonstrate the need for different coordinate systems. In the "Focus on Modeling" following the chapter, both parametric equations and vectors are used to model the path and velocity of a projectile. WEBASSIGN PROVIDES ONLINE TOOLS TO BUILD YOUR STUDENTS' CONFIDENCE AND ELEVATE PERFORMANCE: Leading WebAssign digital resources provide instant access to expertly designed support for both you and your students. Updated, innovative exercises, "Explore It" interactive learning modules and instructional videos reinforce concepts for students and assist in review. "FOCUS ON MODELING" SECTIONS SHOW STUDENTS HOW TO APPLY MATHEMATICS: These "Focus on Modeling" sections illustrate modelling techniques as well as how mathematics can be applied to model real-life situations. These sections teach students how to create their own mathematical models rather than use prefabricated formulas. REAL-WORLD APPLICATIONS ENGAGE STUDENTS: This title draws upon applications from engineering, physics, chemistry, business, biology, environmental studies and other fields to demonstrate how mathematics is used to model real-life situations. This approach reinforces the relevance and importance of the principles students are learning. TRIGONOMETRY APPROACH PROVIDES FLEXIBILITY IN YOUR INSTRUCTION: The chapters on trigonometry (Chs. 5, 6 and 7) are written so you have a choice of beginning with either the right triangle approach or the unit circle approach. Each approach to trigonometry is accompanied by the applications appropriate for that approach. Students clearly understand the reasons behind the different approaches to trigonometry. Cengage provides a range of supplements that are updated in coordination with the main title selection. For more information about these supplements, contact your Learning Consultant. 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FOCUS ON MODELING: FITTING POLYNOMIAL CURVES TO DATA. 4. EXPONENTIAL AND LOGARITHMIC FUNCTIONS. Chapter Overview. Exponential Functions. The Natural Exponential Function. Logarithmic Functions. Laws of Logarithms. Exponential and Logarithmic Equations. Modeling with Exponential Functions. Logarithmic Scales. Chapter 4 Review. Chapter 4 Test. FOCUS ON MODELING: FITTING EXPONENTIAL AND POWER CURVES TO DATA. 5. TRIGONOMETRIC FUNCTIONS: UNIT CIRCLE APPROACH. Chapter Overview. The Unit Circle. Trigonometric Functions of Real Numbers. Trigonometric Graphs. More Trigonometric Graphs. Inverse Trigonometric Functions and Their Graphs. Modeling Harmonic Motion. Chapter 5 Review. Chapter 5 Test. FOCUS ON MODELING: FITTING SINUSOIDAL CURVES TO DATA. 6. TRIGONOMETRIC FUNCTIONS: RIGHT TRIANGLE APPROACH. Chapter Overview. Angle Measure. Trigonometry of Right Triangles. Trigonometric Functions of Angles. Inverse Trigonometric Functions and Triangles. The Law of Sines. The Law of Cosines. Chapter 6 Review. Chapter 6 Test. FOCUS ON MODELING: SURVEYING. 7. ANALYTIC TRIGONOMETRY. Chapter Overview. Trigonometric Identities. Addition and Subtraction Formulas. Double-Angle, Half-Angle, and Sum-Product Formulas. Basic Trigonometric Equations. More Trigonometric Equations. Chapter 7 Review. Chapter 7 Test. FOCUS ON MODELING: TRAVELING AND STANDING WAVES. 8. POLAR COORDINATES AND PARAMETRIC EQUATIONS. Chapter Overview. Polar Coordinates. Graphs of Polar Equations. Polar Form of Complex Numbers; DeMoivre's Theorem. Plane Curves and Parametric Equations. Chapter 8 Review. Chapter 8 Test. FOCUS ON MODELING: The Path of a Projectile. 9. VECTORS IN TWO AND THREE DIMENSIONS . Chapter Overview. Vectors in Two Dimensions. The Dot Product. Three –Dimensional Coordinate Geometry. Vectors in Three Dimensions. The Cross Product. Equations of Lines and Planes. Chapter 9 Review. Chapter 9 Test. FOCUS ON MODELING: VECTOR FIELDS. 10. SYSTEMS OF EQUATIONS AND INEQUALITIES. Chapter Overview. Systems of Linear Equations in Two Variables. Systems of Linear Equations in Several Variables. Matrices and Systems of Linear Equations. The Algebra of Matrices. Inverses of Matrices and Matrix Equations. Determinants and Cramer's Rule. Partial Fractions. Systems of Non-Linear Equations. Systems of Inequalities. Chapter 10 Review. Chapter 10 Test. FOCUS ON MODELING: LINEAR PROGRAMMING. 11. CONIC SECTIONS. Chapter Overview. Parabolas. Ellipses. Hyperbolas. Shifted Conics. Rotation of Axes. Polar Equations of Conics. Chapter 11 Review. Chapter 11 Test. FOCUS ON MODELING: CONICS IN ARCHITECTURE. 12. SEQUENCES AND SERIES. Chapter Overview. Sequences and Summation Notation. Arithmetic Sequences. Geometric Sequences. Mathematics of Finance. Mathematical Induction. The Binomial Theorem. Chapter 12 Review. Chapter 12 Test. FOCUS ON MODELING: MODELING WITH RECURSIVE SEQUENCES. 13. LIMITS: A PREVIEW OF CALCULUS. Chapter Overview. Finding Limits Numerically and Graphically. Finding Limits Algebraically. Tangent Lines and Derivatives. Limits at Infinity: Limits of Sequences. Areas. Chapter 13 Review. Chapter 13 Test. FOCUS ON MODELING: INTERPRETATIONS OF AREA. APPENDIX A: Geometry Review. APPENDIX B: Calculations and Significant Figures (available on website). APPENDIX C: Graphing with a Graphing Calculator (available on website). APPENDIX D: Using the TI-83/84 Graphing Calculator (available on website). James Stewart The late James Stewart received his M.S. from Stanford University and his Ph.D. from the University of Toronto. He conducted research at the University of London and was influenced by the famous mathematician George Polya at Stanford University. Dr. Stewart most recently served as a professor of mathematics at McMaster University, and his research focused on harmonic analysis. 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Each approach to trigonometry is accompanied by the applications appropriate for that approach, clarifying the reason for different approaches to trigonometry. Mathematics in the Modern World vignettes show that mathematics is a living science crucial to the scientific and technological progress of recent times, as well as to the social, behavioral, and life sciences. Discovery/Discussion/Writing problems at the end of every section encourage students to use and develop conceptual, critical thinking, and writing skills. Online Discovery Projects engage students by providing a challenging but accessible set of activities that enable them (perhaps working in groups) to explore in greater depth an interesting aspect of the topic they have just learned. Review Sections and Chapter Tests at the end of each chapter help students gauge their learning progress. 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