Course: AP Calculus AB
Text: Calculus: Graphical, Numerical, Algebraic
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| Day | Topic | Assignment | Comments |
| :---: | :---: | :---: | :---: |
| 1 | Lines: <br> - Increments <br> - Slope of a line <br> - Parallel and perpendicular lines <br> - Equations of lines, <br> - Applications | 1.1: 3 - $36 \mathrm{~m} 3,37,39,43,49$ |  |
| 2 | Functions and Graphs: <br> - Functions <br> - Domains and ranges <br> - Viewing and interpreting graphs <br> - Even and odd functions - symmetry | 1.2a: 3 - $33 \mathrm{~m} 3,35,36,39$ |  |
| 3 | Functions and Graphs: <br> - Functions defined in pieces <br> - Absolute value function <br> - Composite functions | 1.2b: $42,45,49,53,57,63,65,66$ |  |
| 4 | Exponential Functions <br> - Exponential Growth <br> - Exponential decay <br> - Applications <br> - The number $e$ | 1.3: $3-21 \mathrm{~m} 3,22,24-29,34,38$ |  |
| 5 | Parametric Equations: <br> - Relations <br> - Circles <br> - Ellipses | 1.4a: Exploration 1,2 | $\text { Quiz } 1.1 \text { - }$ |
| 6 | Parametric Equations: <br> - Lines and other curves | 1.4b: 3, 6, 7-27 odd, 30, 42 |  |
| 7 | Functions and Logarithms: <br> - One - to - one Functions <br> - Inverses <br> - Finding Inverses <br> - Logarithmic Functions <br> - Properties of Logarithms <br> - Applications | 1.5: $3-42 \mathrm{~m} 3,43,48,50$ |  |
| 8 | Trigonometric Functions: <br> - Radian Measure <br> - Graphs of Trigonometric Functions <br> - Periodicity <br> - Even and Odd Trigonometric Functions | 1.6a: Exploration 1, 2 |  |


|  | - Transformations of Trigonometric graphs <br> - Applications |  |  |
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| 9 | Trigonometric Functions: <br> - Inverse Trigonometric Functions | 1.6b: $2-34$ even, 38, 45 |  |
| 10 | Review worksheet Quiz 1.4-1.6 | Review worksheet | $\begin{array}{\|l} \hline \text { Quiz } 1.4 \text { - } \\ \hline 1.6 \\ \hline \end{array}$ |
| 11 | Go over review | Go over review |  |
| 12 | Unit 1 Test | Unit 1 test |  |
| 13 | Rates of Change and Limits: <br> - Average and Instantaneous Speed <br> - Definition of Limit <br> - Properties of Limits | 2.1a: $9-30 \mathrm{~m} 3$ |  |
| 14 | Rates of Change and Limits: <br> - One - sided and Two - sided Limits <br> - Sandwich Theorem | $\begin{aligned} & \text { 2.1b: } 3,6,32,35,39,42,44,45,48,49, \\ & 55,58 \end{aligned}$ |  |
| 15 | Limits Involving Infinity: <br> - Finite Limits as x Approaches $\pm$ Infinity <br> - Sandwich Theorem Revisited | 2.2a: 3 - 27 m3 and Exploration 1 |  |
| 16 | Limits Involving Infinity: <br> - Infinite Limits as x approaches a <br> - End Behavior Models <br> - "Seeing" Limits as x Approaches $\pm$ Infinity | 2.2b: $30-48 \mathrm{~m} 3,54,57,59$ |  |
| 17 | Quiz 2.1-2.2 |  |  |
| 18 | Continuity: <br> - Continuity at a Point | 2.3a: pg. 70 Exploration 1, pg. 80: $2-20$ even |  |
| 19 | Continuity: <br> - Continuous Functions <br> - Algebraic Combinations <br> - Composites <br> - Intermediate Value Theorem for Continuous Functions | 2.3b: 22 - 30 even, 36, 39, 42, 43, 48 |  |
| 20 | Rates of Change and Tangent Lines: <br> - Average Rates of Change <br> - Tangent to a Curve <br> - Slope of a Curve | 2.4a: 1-8 |  |
| 21 | Rates of Change and Tangent Lines: <br> - Normal to a Curve <br> - Speed revisited | 2.4b: 9 - 33 odd, 30, 41 |  |
| 22 | Review worksheet and pg. 92: 29, 41, 42 Quiz 2.3, 2.4 | Review worksheet and pg. 92: 29, 41, 42 | $\begin{aligned} & \text { Quiz 2.3, } \\ & 2.4 \end{aligned}$ |
| 23 | Go over review | Go over review |  |
| 24 | Test Unit 2 | Test Unit 2 |  |


| 25 | Derivative of a Function: <br> - Definition of a Derivative <br> - Notation <br> - Relationships between the graphs of f and f' | 3.1a: $1-6$ |  |
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| 26 | Derivative of a Function: <br> - Graphing the derivative from data. | 3.1b: 7 - 10, 11 - 17 odd Exploration 1 page 98 |  |
| 27 | Derivative of a Function: <br> - One - sided derivatives | 3.1c: 19 - 25 odd, 16, 18, 26 |  |
| 28 | Differentiability: <br> - How f'(a) might fail to exist | 3.2a: 1-10 \& Exploration 1 pg. 107 |  |
| 29 | Differentiability: <br> - Differentiability implies local linearity <br> - Derivatives on a calculator <br> - Differentiability implies continuity <br> - Intermediate value theorem for derivatives | 3.2b: $11-17$ odd, $18-22,29,31$ |  |
| 30 | Rules for Differentiation: <br> - Positive integer powers, multiples, sums, and differences | 3.3a: $1-10,25,27$ |  |
| 31 | Rules for Differentiation: <br> - Products and quotients | 3.3b: $11-21,23$ |  |
| 32 | Rules for Differentiation: <br> - Negative integer powers of $x$ <br> - Second and higher order derivatives | 3.3c: $28-34$ |  |
| 33 | Quiz 3.1-3.3 |  |  |
| 34 | Velocity and Other Rates of Change: <br> - Instantaneous rates of change <br> - Motion along a line | 3.4a: 1, 2, 13, 14, 16, 21 (individually), 23 |  |
| 35 | Velocity and Other Rates of Change: <br> - Motion along a line continued | 3.4b: 4, 5, 24, 29, 31, 33, Exploration 2 pg. 127 |  |
| 36 | Velocity and Other Rates of Change: <br> - Sensitivity to change | 3.4c: 10, 25, 27 (individually), 30, 36, Exploration 3 pg. 127 |  |
| 37 | Derivatives of Trigonometric Functions: <br> - Derivative of the sine function <br> - Derivative of the cosine function <br> - Simple harmonic motion | 3.5a: 1, 3, 5, 7, 8, 10, 14 |  |
| 38 | Derivatives of Trigonometric Functions: <br> - Jerk | 3.5b: $2,4,6,9,12,18$ |  |
| 39 | Derivatives of Trigonometric Functions: <br> - Derivatives of the other basic trigonometric functions | 3.5c: 16, 20, 25 (a, b), 27, 29, 31, 33 | Quiz: <br> Matching graphs |
| 40 | Chain Rule: <br> - Derivatives of a composite function | 3.6a: 3-33 multiples of 3 |  |


| 41 | Chain Rule: <br> - "Outside - Inside" rule <br> - Repeated use of the chain rule <br> - Slopes of parametrized curves. | 3.6b: 36-63 multiples of 3 |  |
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| 42 | Chain Rule: <br> - Power chain rule | 3.6c: 50, 61, 64, 66, 69 |  |
| 43 | Quiz: 3.4 - 3.6 |  |  |
| 44 | Implicit Differentiation: <br> - Implicitly defined functions <br> - Lenses, tangents, and normal lines | 3.7a: 9, 12, 18, 27, 30,33, 36, 39,41 | Derivative Quiz |
| 45 | Implicit Differentiation: <br> - Derivatives of higher order <br> - Rational powers of differentiable functions | 3.7b: $3,6,15,21,24,42,45,46$ |  |
| 46 | Derivatives of Inverse Trig. Functions <br> - Derivatives of inverse functions <br> - Derivatives of the Arcsine <br> - Derivative of the Arctangent | 3.8a: 3, 4, 5, 10, 17, 22, 23, 27 |  |
| 47 | Derivatives of Inverse Trig. Functions <br> - Derivative of the Arcsecant <br> - Derivatives of the other three | 3.8b: 1, 7, 9, 11, 13, 15, 21, 24, 30 |  |
| 48 | Derivatives of Exponential and Logarithmic Functions <br> - Derivative of $\mathrm{e}^{\mathrm{x}}$ <br> - Derivative of $\mathrm{a}^{\mathrm{x}}$ | 3.9a: Exploration 1 page $166 \&$ Pg. 170 - <br> 171: 1-9 odd, 15-18 | Derivative Quiz |
| 49 | Derivatives of Exponential and Logarithmic Functions <br> - Derivative of $\ln x$ <br> - Derivative of $\log _{a} x$ | 3.9b: 21-39 odd |  |
| 50 | Derivatives of Exponential and Logarithmic Functions <br> - Power rule for arbitrary real powers | 3.9c: 11, 13, 19, 41, 47-50 |  |
| 51 | AP Review | pg. 173-174: 59-63 | Derivative Quiz |
| 52 | AP Review Quiz: 3.7 - 3.9 | pg. 173-174: $64-67,70,78$ | $\begin{aligned} & \text { Quiz: } 3.7-1 \\ & 3.9 \end{aligned}$ |
| 53 | Test Review Worksheet | Test Review Worksheet |  |
| 54 | Go over review | Go over review |  |
| 55 | Test Unit 3 | Test |  |
| 56 | Extreme Values of Functions <br> - Absolute (Global) extreme values | 4.1a: 1-10 |  |
| 57 | Extreme Values of Functions <br> - Local (Relative) extreme values <br> - Finding extreme values | 4.1b and c: 11-26 | Derivative Quiz |


| 58 | Extreme Values of Functions <br> - Absolute (Global) extreme values <br> - Local (Relative) extreme values <br> - Finding extreme values | 4.1d: $27-30,35,36,37,39$ |  |
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| 59 | Extreme Values of Functions <br> - Absolute (Global) extreme values <br> - Local (Relative) extreme values <br> - Finding extreme values | 4.1e: 41, 43, 45 - 49; Exploration 1 pg. 183 | Derivative Quiz |
| 60 | Mean Value Theorem <br> - Mean value theorem <br> - Physical interpretation | 4.2a: 15, 18, 21, 24, 39, 42, 48, 52 |  |
| 61 | Mean Value Theorem <br> - Increasing and decreasing functions <br> - Other consequences | 4.2b: 3, 6, 9, 12, 27, 30, 33, 43, 45 |  |
| 62 | Connecting $f$ ' and $f^{\prime \prime}$ with the graph of $f$ <br> - First derivative test for local extrema | 4.3a: 3-6, 37, 40, 43, 45 |  |
| 63 | Connecting $f$ ' and $f^{\prime \prime}$ with the graph of $f$ <br> - Concavity <br> - Second derivative test for local extrema | 4.3b: 1, 29, 33, 34, 41, 42, 44 |  |
| 64 | Connecting $f$ ' and $f$ ' with the graph of $f$ <br> - Learning about functions from derivatives | 4.3c: pg. 204: $7-25 \mathrm{~m} 3,46,48,49$ |  |
| 65 | Quiz: 4.1 - 4.3 |  |  |
| 66 | Modeling and Optmization <br> - Examples from business and industry | 4.4a: 9, 17, 19 |  |
| 67 | Modeling and Optmization <br> - Examples from mathematics | 4.4b: 1, 5, 8 |  |
| 68 | Modeling and Optmization <br> - Examples from economics | $\begin{aligned} & 4.4 \mathrm{c}: \underline{\text { Day 1: }} 3 \mathrm{pg} .215-217: 12,20,31, \\ & 36 \end{aligned}$ |  |
| 69 | Modeling and Optmization <br> - Examples from business and industry <br> - Examples from mathematics <br> - Examples from economics | $\begin{aligned} & \text { 4.4d: Day 2: pg. } 215-217: 35,38,49,51 \text {, } \\ & 52 \end{aligned}$ | Volume Lab |
| 70 | Linearization and Newton's Method <br> - Linear approximation <br> - Newton's method | 4.5a: pg. 229: 3, 5-7, 9, 11, 14, 15 pg. 220: Exploration 1 |  |
| 71 | Linearization and Newton's Method <br> - Differentials <br> - Estimating change with differentials | 4.5b: $8,18,19,22,25,33,36$ |  |
| 72 | Linearization and Newton's Method <br> - Absolute, relative, and percentage change <br> - Sensitivity to change | 4.5c: $27,30,37,39,44,46,50,51$ |  |
| 73 | Related rates <br> - Related rate equations <br> - Solution strategy | 4.6a: 3, 9, 12, 18, 23 |  |


| 74 | Related rates <br> - Solution strategy <br> - Simulating elated motion | 4.6b: 6, 13, 15, 21, 22 |
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| 75 | Quiz: 4.4 - 4.6 |  |
| 76 | AP Review | pg. 238 - 239: $24,27,30,33,36,39,40$ |
| 77 | Review ws | Review ws |
| 78 | Go over review ws | Go over review ws |
| 79 | Unit 4 Test | Unit 4 Test |
| 80 | Exam Review |  |
| 81 | Exam Review |  |
| 82 | Exam Review |  |
| 83 | Exam |  |
| 84 | Estimating with Finite Sums <br> - Distance traveled <br> - Rectangular approximation method | 5.1 a: $1-4,6,9,12 \&$ Pg. 251: Exploration 1 |
| 85 | Estimating with Finite Sums <br> - Volume of a sphere <br> - Cardiac output | 5.1b: 14, 15, 18, 20, 21, 24, 26 |
| 86 | Definite Integrals <br> - Riemann sums <br> - Terminology and notation of integration <br> - Definite integral and area | 5.2a: $1-6,13-27$ odd |
| 87 | Definite Integrals <br> - Constant Functions <br> - Integrals on a calculator <br> - Discontinuous integrable functions | 5.2b: 7 - 11 odd, 39, 41, 43-47 |
| 88 | Definite Integrals and Antiderivatives <br> - Properties of definite integrals | 5.3a: 1-6, 35, 36 |
| 89 | Definite Integrals and Antiderivatives <br> - Average value of a function <br> - Mean value theorem for definite integrals <br> - Connecting differential and integral calculus | $\begin{aligned} & 5.3 \mathrm{~b} \text { and c: pg. } 275: 9-27 \mathrm{~m} 3,32-35, \\ & 40 \end{aligned}$ |
| 91 | Quiz 5.1-5.3 |  |
| 92 | Fundamental Theorem of Calculus <br> - Fundamental theorem part 1 | 5.4a: 37, 39, 41-48 |
| 93 | Fundamental Theorem of Calculus <br> Graphing the function [integral of $\mathrm{F}(\mathrm{t}) \mathrm{dt}$ ] Fundamental theorem part 2 | 5.4 b and c: Pg. 286: 1-13 odd, 19-24 (1-8 graphically also) |
| 95 | Fundamental Theorem of Calculus <br> - Area connection <br> - Applications of the fundamental theorem | 5.4 d and e: $15-17,25-33$ odd, $52,53-$ 59 odd |
| 97 | Trapezoidal Rule | 5.5a: 1-9 |

$\left.\begin{array}{|c|l|l|l|} & \text { • Trapezoidal approximations } & & \\ \hline 98 & \begin{array}{l}\text { Trapezoidal Rule } \\ \bullet \\ \text { Simpson's rule }\end{array} & 5.5 \mathrm{~b}: \text { Program ws Trap and Simpson Rule } & \text { In IT } \\ \hline 99 & \begin{array}{l}\text { Trapezoidal Rule } \\ \bullet \text { Error analysis }\end{array} & 5.5 \mathrm{c}: \text { Pg. 296-297: 10, 11, 13, 16-19, 23 }\end{array}\right]$

|  | - Numerical Solutions <br> - Graphical solutions |  |
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| 118 | Numerical Methods Improved Euler's method | 6.6c: $17,19,22,24,25,28$ |
| 119 | Unit 6 Review ws | Unit 6 Review ws |
| 120 | Go over Unit 6 Review | Go over Unit 6 Review |
| 121 | Unit 6 Test | Unit 6 Test |
| 122 | Integral as Net Change <br> - Linear motion revisited | 7.1a: pg. 365: Exploration 1, Pg. 371: 1 8 |
| 123 | Integral as Net Change <br> - General strategy | 7.1b: $9-16$ |
| 124 | Integral as Net Change <br> - Consumption over time <br> - Net change from data <br> - Work | 7.1c: $17,20-22,24-27,29,31$ |
| 125 | Areas in the Plane <br> - Area between curves <br> - Area enclosed by intersecting curves | 7.2a: $1,2,5,6,11,13,14$ |
| 126 | Areas in the Plane <br> - Boundaries with changing functions <br> - Integrating with respect to y | 7.2b: 3, 7, 9, 15-25 odd |
| 127 | Areas in the Plane <br> - Saving time with geometry formulas | 7.2c: 27, 29, 33, 36, 40, 42, 43, 46 |
| 128 | Volumes <br> - Volume as an integral <br> - Square cross sections <br> - Circular cross sections | 7.3a: pg. 387: Exploration 1 and pg. 390 -391: 3, 5 |
| 129 | Volumes <br> - Other cross sections | 7.3b: $1,4,6,7,8,9$ |
| 130 | Volumes <br> - Volume as an integral <br> - Square cross sections <br> - Circular cross sections <br> - Other cross sections | 7.3c: $11-25$ odd, 28, 29 |
| 131 | Volumes <br> - Volume as an integral <br> - Square cross sections <br> - Circular cross sections <br> - Other cross sections | 7.3d: $33,39,42,44,49,53,57,60,63$ |
| 132 | Lengths of Curves <br> - A sine wave <br> - Length of a smooth curve |  |
| 133 | Lengths of Curves <br> - Vertical tangents, corners, and cusps |  |


| 134 | Applications from Science and Statistics <br> - Work revisited | 7.5a: 1, 3, 5, 6, 8 |
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| 135 |  | Quiz: $7.1-7.3$ |
| 136 | Applications from Science and Statistics <br> - Fluid force and pressure | 7.5b: $10,12,17,21,24$ |
| 137 | Applications from Science and Statistics <br> - Normal probabilities | 7.5c: $25-29$ |
| 138 | Applications from Science and Statistics <br> - Work revisited <br> - Fluid force and pressure <br> - Normal probabilities | 7.5d: 30, 31, 33, 35, 37, 39 |
| $\begin{gathered} 139- \\ 151 \end{gathered}$ |  | AP Review 12 days minimum |
| 151-? | 6.3 - Integration by parts <br> Finish Chapter 7 <br> Begin Chapter 8 <br> - Improper Integrals <br> - Partial Fractions |  |

