Chapter and Essential Questions. AP Calculus AB, Marking Period One
Chapter 1: Limits and their Properties. How can I find the limiting factor of a cost?
Chapter 2: Differentiation. How can I find the instantaneous rate of change of a particle in motion?
Chapter 3: Applications of Differentiation. How can calculus be used to solve real life applications where we want to maximize or minimize an outcome?

Myth surrounding Calculus

Most students have a fear of calculus because of the many myths surrounding it. I address these concerns by introducing calculus gently to my students, explaining to them that Calculus relates topics in an elegant, brain-bending manner. I show them the progression from arithmetic to calculus. **Arithmetic** is about manipulating numbers (subtraction, division, etc.). **Algebra** finds patterns between numbers: $x^2 + y^2 = r^2$ is a famous relationship, describing the sides of a right triangle. Algebra finds entire sets of numbers — if you know x and y, you can find r. **Calculus** finds patterns between equations: you can see how one equation (circumference $= 2\pi r$) relates to a similar one (area $= \pi r^2$)

A typical example of this would be relating the definition of the study of limits to the slopes in Algebra.

It is my belief that each student can appreciate the core ideas of calculus. AP Calculus AB is within each student's reach, if they know algebra and have a general interest in math. I would love for every one of my students to understand the core concepts of calculus and say "whoa".

Course Overview

My main objective in teaching AP® Calculus AB is to provide students with an opportunity to explore the higher levels of mathematics

Through this exploration and interaction with mathematics, I hope to enable students to appreciate the higher intricacies of problems, and develop a solid foundation in the Calculus AB topic outline as it appears in the *AP® Calculus Course Description*, which they can take with them into their higher level classes. I expect a lot of my students, whether in class or at home writing up assignments.

In order to best teach all students, I strive to present all topics in many different ways. Among these are graphical, numerical, analytical and verbal approaches to almost all topics, concepts and problems. My classroom is equipped with a Smart Board interactive whiteboard which uses DViT (Digital Vision Touch) technology.

The Smart Board comes with a whole range of resources that brings Calculus to life. In addition to the Smart board, we have access to a computer lab. Students have access to the Internet for research, can use the Geometers Sketchpad and Calculus in Motion (Approval Pending) .A TI-CBL unit loaned to our school is sometimes used for labs, demonstrations, and to collect data to further enhance studies. I also use TI programs for the TI-84 plus projected onto the whiteboard regularly to give students an idea of the big picture of a problem. Students are taught the table feature or math menu (zeros, derivative at a point, or numerical integral) in graphical mode, to get a more numerical approach to problems. The school provides a TI-84 + graphing calculator that can be checked out to students for the year. Students are required to submit evidence to the class that they have learned how to use at least two applets related to the mathematics that they have studied in the class. Report to the class: show the applet to the class and give brief comments about how it relates to the course, making it clear that they have understood the purpose of the applet.

Study cooperative groups are formed early in the school year and employ the use of cooperative learning

techniques for daily assignments with access to the instructor as needed. The instructor strives for a positive learning environment in the classroom.

Reading and Writing in Mathematics.

Students are encouraged to read mathematical "articles/pieces" that is both interesting and understandable. Sources of reading **must** be pre-approved by the instructor. After reading the articles or books, each student will report to the class for at least 5 minutes but no longer than 10 minutes: state the source of their reading and explain the reading, making it clear that they have understood the material. This must be done four times during the course, and they may schedule your report at any time throughout the course. These grades will apply toward the 4th marking period averages, no matter when they choose to report. Writing about concepts is included in almost every unit to encourage students to write about mathematics.

Assessment

Students are assessed in my class in different ways all through the course. Each day, students have an assignment addressing the topics we covered in class. With the exception of assessment days, every class will generally end with an exit slip, where students will need to, in English words and sentences, summarize what they learned that day, and how they can use those newly learned practices. Students frequently receive a "packet" which has problems from released AP exams, both multiple choice and free response designed to target the subject from different perspectives. Students practice on questions from old AP exams on a weekly basis.

In addition, students maintain a binder * (which includes handouts, lab sheets, notes, charts, projects, and homework) to take to college with them to use as a study aid in future math courses.

On both of these assignments (homework and Packets) students are encouraged to work together to complete the problems, but are required to write up their own solutions to problems. For comprehension of calculus concepts, students must make the mathematical connections to previous learning in order to have a true understanding of new calculus concepts and applications. Solutions to problems are found *graphically, numerically, analytically, and verbally* in order to demonstrate knowledge of the calculus curriculum being studied. In addition, proper vocabulary and symbolism are used in the classroom and expected of the students Once or twice each unit we will have a half period test on material covered up to the day before. On these assessments students are allowed to use a calculator about half of the time. At the end of each unit students are given an exam covering all material in the unit. These exams are generally written in two parts, one calculator active, and one without calculators. Problems are generally open ended, and students are required to show work to get full credit. Often there is at least one released Free Response question from previous AP exams, which is scored in the same manner as they will be on the AP exam. Students are encouraged to take the AP Calculus AB exam.

Chapter and Essential Questions. AP Calculus AB, Marking Period One
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Chapter 3: Applications of Differentiation. How can calculus be used to solve real life applications where we want to maximize or minimize an outcome?

PRIMARY TEXTBOOK:

Authors: Larson, Ron , Robert, Hostetler , and Edwards, Bruce
Calculus of a Single Variable. Houghton Mifflin Company, 2006, Eighth Edition

Description: This textbook is currently supplemented by resources from several other sources, which are listed below.

SUPPLEMENTARY MATERIALS USED IN CLASS:
Authors: Larson, Ron, Hostetler, Robert , and Edwards Bruce
Title: Calculus with Analytic Geometry: 8h Edition Publisher: Houghton Mifflin Company, 2006.

Authors: Cindy Clements, Ralph ,Pantozzi and Scott Steketee
Title: Exploring Calculus with Geometer Sketchpad. Key Curriculum Press(c) 2002

Authors: Finney, Ross L., Franklin D. Demana, Bert K. Waits, and Daniel Kennedy.
Title: Calculus—Graphical, Numerical, Algebraic. 1st ed. Menlo Park: Scott-Foresman Addison-Wesley, 1999.

Author: Lederman, David.
Title: Multiple-Choice & Free-Response Questions In Preparation for the AP Calculus (AB) Examination. 8th Edition. Brooklyn: D&S Marketing Systems, Inc. 2003.

Authors: Finney, R., Demana, F., Waits, B., and Kennedy, D.
Calculus: Advanced Placement Correlations and Preparation, 2003, Prentice Hall, Upper Saddle River, NJ.

AP Calculus Multiple Choice Questions, 1969-1997

AP Calculus Free Response Questions, 1969-1978; 1979-1988; 1989-1998

AB Free Response Questions posted on APCENTRAL (1999-2013)

TI-SmartView software (a computer emulator of the TI-84)/ TI-84 overhead calculator

Geometer Sketchpad /Calculus in Motion (single license for presentation only)

Handouts created on function growth, conics, and polar/parametric coordinate systems
Supplementary readings from various internet sources.

Course Planner: Listed below is the pacing of our AP Calculus AB course as it is taught over 4 Marking Periods on a 83-minute block schedule. Extended class periods can be arranged after school when needed.

Chapter and Essential Questions. AP Calculus AB, Marking Period One
Chapter 1: Limits and their Properties. How can I find the limiting factor of a cost?
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Chapter 3: Applications of Differentiation. How can calculus be used to solve real life applications where we want to maximize or minimize an outcome?

KEY:
HW - Homework O - Odd Numbered Problem B – Bonus Problem
E - Even Numbered Problem NOS - Question Numbers RE – Released AP Exams
(8^{th} Edition) - Calculus of a Single Variable. Houghton Mifflin Company, 2006, Eighth Edition
PS- Problem Solving and PEC- Putnam Exam Challenge from (8^{th} Edition)

Day 1: Wednesday, 11 September	Preparation for Calculus Section 1.1 Note taking and Reading Guide: 1. What is calculus all about? 2. What two classic problems does calculus solve? 3. How are the problems related? 4. List two problems you can solve with differential/ integral calculus. 5. Explain: Calculus does to algebra what algebra does to arithmetic. Section 1.1/ Page 46 / NOS 1, 2, 5, 6, 9,11
Day 2: Friday, 13 September	Investigating Limits On The Ti-84 Calculator Through Tables Notes on techniques for finding limits Section 1.2 / Pages 53-54 / NOS 1-14, 17-26 Section 1.3 / Pages 64-66 / NOS 9-31 O, 37-43 O
Day 3: Tuesday, 17 September	Notes on the definition of limit Section 1.2 / Pages 54-55 / 33 - 39, 41, 43, 52 Section 1.3 / Pages 65 / 45-77 O, 83, 87, 103 HW # 11 due next class: Pages 54-55 / NOS 20- 30
Day 4: Thursday, 19 September	Quiz on Sections 1.1-1.3 Notes on continuity and One sided Limits O Section 1.4 / Pages 75-78 / NOS 1-21 O, 25-47 HW #12 due next class: Page 78, NOS 86-97 / 46,RE
Day 5: Monday, 23 September	Notes on infinite limits and Continuity Section 1.4 / Pages 76-78 / NOS 5- 11 O, 33 51- 75, Section 1.5 / Page 84 / NOS 1-17 O, 23, 37-43 O HW #13 due next class: Pages 76-78 / NOS 12-20
Day 6: Wednesday, 25 September	Chapter 1 Quiz HW (Selected 2003 -2010 Free Response) Limits extra practice (Notes & Practice) HW #14 due next class: Page 80/ NOS 58, 86, 88; 88/ 4, 14, 26, 34, 36- 44 E
Day 7: Friday, 27 September	Investigate Differentiability and Continuity with the Graphing Calculator. Section 1.R/ Pages 87-88/ NOS 5, 7, 11-21 O, 25, 29-31, 33, 35, 39, 41, 47, 49, 53-67 O Review (Practice Tests, 1-3) The Calculus Controversy Essay

Chapter and Essential Questions. AP Calculus AB, Marking Period One
Chapter 1: Limits and their Properties. How can I find the limiting factor of a cost?
Chapter 2: Differentiation. How can I find the instantaneous rate of change of a particle in motion?
Chapter 3: Applications of Differentiation. How can calculus be used to solve real life applications where we want to maximize or minimize an outcome?

Day 8: Tuesday, 1 October	Chapter 1 Test (Open Book) Putnam Exam Challenges due next class: Page 58/ NOS 75, 76; Page 82/ NOS 113, 114 Chapter 1 PS due next class: Pages 93-94
Day 9: Thursday, 3 October	The Calculus Controversy Essay due today. (Notes & Practice) Notes on the definition of derivative, one-sided derivatives and the tangent line problem. Section 2.1/ Pages 98-101/ NOS 1, 13-27 O, 33, 37-40, 41-51 O, 57, 65, 71, 73 HW #21/ / Pages 98-101/ Nos 2, 12-24 E , 32, RE
Day 10: Monday, 07 October	Notes on the Basic Differentiation Rules and rates of change. Section 2.2 / Pages 110-113 / NOS 3-23o, 31-59 O, 63-75, 89-93 O, HW #22: (Selected 2003 -2010 Free Response)
Day 11: Wednesday, 09 October	Notes on the product and quotient rules. Section 2.3 / Pages 121-123/ NOS 11-21 O, 25-37 O, 43-53o, 61, 63, 69-77 O, 81, 97, 101 HW #23 due next class: Page 104/ Nos 18, 22, 44, 46, 48, 52, 66, 72, 82, 90,
Day 12: Friday, 11 October	Notes on the chain rule Section 2.4/ Pages 130-133/ NOS 7-31o, 39-51 O, 63-69 O, 79, 81, 95, 99 HW#24 due next class: Pages 130-133/ Nos 24, 32, 40, 52, 54, 60, 66-76 E, 90-96 E, RE
Day 13: Wednesday, 16 October	Interim Progress Report Due Today Section 2.1- 2.3 Quiz (Non Calculator) Notes on implicit differentiation Section 2.5/ Pages 139-140/ Nos 1-17 O, 21-31 O, 45, 49, 53, 57, 59, 60 HW # 25 due next class: Pages 139-140/ Nos 8, 14, 18, 22, 24, 72, 82a, 82b, 90, 102, /Writing Ass.
Day 14: Friday, 18 October	Notes on related rates Geometer's Sketchpad: Calculus in Motion Section 2.6/ Pages 146-147/ NOS 3-7 O, 13, 15-17, 19-29 O, 33-37, 43 HW #26 due next class: Pages 146-147/ NOS 10, 24, 44, 52, 60, 74, 90, 96, 100a, 100b, RE
Day 15: Tuesday, 22 October	Notes on related rates (Continued) Section 2.1-2.5 practice (Notes & Practice, 4b) HW # 27 due next class: Pages 146-148/ NOS 4, 6, 8, 10, 14, 26, 28, 32, 42 Hand in Writing Assignment due today

Chapter and Essential Questions. AP Calculus AB, Marking Period One
Chapter 1: Limits and their Properties. How can I find the limiting factor of a cost?
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Chapter 3: Applications of Differentiation. How can calculus be used to solve real life applications where we want to maximize or minimize an outcome?

Day 16: Thursday, 24 October	Section 2.1- 2.3 Quiz /KWL Quiz Derivatives & Continuity Learning Check. (TI and Exploring Calculus) Derivatives: Cooperatives Group Review Section 2.R/ Pages 150-152/ NOS 1-29 O, 41-85O HW # 27 due next class: Pages 150-152/ NOS 4b, 6a, 14, 18a, 20b, 22a, 24, 26a, 26b, 28, RE
Day 17: Monday, 28 October	Derivatives: Cooperatives Group Review (Continued) Putnam Exam Challenges due next class: Page 140/ NOS 123, 124 Chapter 2 PS due next class: Pages 161-162 and The Speed Problem (Essay).
Day 18: Wednesday, 30 October	Curve Sketching Discovery Activity Notes on extrema on an interval. Section 3.1/ Pages 160-162/ NOS 5, 7, 13 -55 O Related Rates Take-Home Test
Day 19: Friday, 1 November	Notes on Rolle's Theorem and the Mean Value Theorem. Geometer's Sketchpad: Exploring Calculus Section 3.2/ Pages 167-168/ NOS 1, 3, 5, 9, 13, 19, 23, 29, 31, 32, 37, 39, 45, 49, 51 HW #28 due next class: Pages 167-168/ NOS 4, 8, 14, 24, 26, 40, 42, 48, 50, 60,RE
Day 20: Tuesday, 05 November	Notes on increasing and decreasing intervals and the first derivative test. Section 3.3/ Pages 176-178/ NOS 5, 7, 11, 15, 17, 21, 25, 29, 35, 41, 49, 61, 63, 85, 87, 71 HW #29 due next class: Page 176 / NOS 4- 22 E, 30, 38, 42, 44, 48, 52 Reading and Writing Assignment (concepts)
Day 21: Monday, 11 November	Exam Review (Practice Tests) Find y=, y=(2), tangent line at x=2, normal line at x=2 for the following A) Given: $y=2\pi$ B) Given: $y=2\pi x$
Day 22: Wednesday, 13 November	First Marking Period Exams: Covering Section P.1-6, 1.1-5, 2.1-6
Day 23: Friday, 15 November	Notes on intervals of concavity Section 3.4/ Pages 184-185/ NOS 11, 13, 19, 21, 25, 27, 33, 37, 39, 53, 55, 61 HW #31 due next class: Page 186/ NOS 6, 22, 26, 32, 36, 42, 52, 64, 72, 88, B: 94,RE

Chapter and Essential Questions. AP Calculus AB, Marking Period Two

Chapter 3: Applications of Derivatives. What role do derivatives and limits play as a foundation for the calculus and in practical applications?

Chapter 4: Integration. How can I determine the approximate area of an irregular piece of land? How can I find the net distance traveled? How can I determine the average speed of sound over a given interval?

Day 1: Tuesday, 19 November	Writing Assignment due today Notes on limits at infinity and L'Hopital's rule. Section 3.5 / Pages 193-195 / NOS 15, 17, 21, 27, 29, 31, 41, 57, 61 HW #32 due next class: Pages 195-195 / NOS 12, 20, 24, 34, 40, 54, 56, 62, 68, 76, RE
Day 2: Thursday, 21 November	Summary of curve sketching (Writing) Geometer's Sketchpad: Exploring Calculus Section 3.6/ Pages 202-204/ Nos 5, 7, 11, 23, 33, 41, 55, 59, 61, 67, 69, 77 HW #33 Pages202- 205/ Nos 16, 20 - 30, 36, 66 (Free Response Discussion)
Day 3: Monday, 25 November	Section 3.6 Quiz (Free Response Discussion) Section 3.1-3.6 Cooperative Group Problems HW #34 due next class: Pages 202-204/ Nos 6, 8, 10, 24, 34, 42, 56, 60, 62, 76, B: 70
Day 4: Monday, 02 December	Section 3.1-3.6 Quiz, RE Applications of the Derivative Learning Check (TI-84+ and Exploring Calculus)
Day 5: Wednesday, 04 December	Review (Practice Tests, RE) Section 3.R/ Pages 235-237/Nos 1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23, 25, 27, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, RE
Day 6: Friday, 06 December	Section 3.1-3.6 Test Related Rates Application Problems due Thurs. Putnam Exam challenge due next class: Page 217/ No 78
Day 7: Tuesday, 09 December	Notes on applications of differentiation Section 3.7/ Pages 210-214/ Nos 1b-c, 3, 5, 7, 15, 19, 23, 27, 29, 61
Day 8: Thursday, 12 December	Notes on Newton's method and differentials Section 3.8/ Nos 219-220/Nos 3, 5, 15 – 43 O Section 3.9/ Pages 226-227/ Nos 1, 13, 17, 19, 21, 23, 25, 35, 43, 45, 49 HW #35 due next class: Free Response and Writing Assignment on Sir Isaac Newton.
Day 9: Monday, 16 December	Profit Mathematics (Handout) HW #36 due next class: Pages 232-233/Nos 2, 4, 6, 18, 22, 28, 30, 34, 42, 44, B: 46
Day 10: Wednesday, 18 December	Business and Economic Applications (Handout) *Students will use TI-84 to graph the relations and use the "max/min" trace option to compare the graphical critical points with their analytically*

Chapter 3: Applications of Derivatives. What role do derivatives and limits play as a foundation for the calculus and in practical applications?

Chapter 4: Integration. How can I determine the approximate area of an irregular piece of land? How can I find the net distance traveled? How can I determine the average speed of sound over a given interval?

	found responses to these optimization problems. HW #37 due next class: Pages 240/ Nos 2, 14, 18, 20, 22, 24, 26, 44, 46, 50 Interim Progress due today
Day 11: Friday, 20 December	Maxima/minima and related rates word problems Selected Free Response Problems. Chapter 3 PS due next class: Pages 245-246/Nos 4,6,10,12, 14, 17
Day 12: Thursday, 02 January	Related Rates Sliding Down a Wall Mini Project Derivatives and Differentials Maxima/minima and related rates word problems Section 3.R/ Pages 283-286/ Nos 67, 68, 69, 70, 71, 74, 79, 81, 83, 85, 86, 88
Day 13: Monday, 06 January	Notes on Numerical Integration—Trapezoidal Rule only! Geometer's Sketchpad: Calculus in Motion Section 4.6/Pages 306-308/ (trapezoidal rule only) Nos 1, 3, 5, 7, 9, 15, 17, 19, 39, 40,45,51-63
Day 14: Wednesday, 08 January	Notes on Area (Notes and Practice, 7) Approximating Area Under a Curve Geometer's Sketchpad: Exploring Calculus Section 4.2/ Pages 260-263/ Nos 7, 9, 11, 15, 17, 19, 23, 25, 29, 31, 37, 41, 47, 51, 59, 63, 69 HW # 41 Due next class (trapezoidal rule only): Pages 304-305/ Nos 4, 6, 8, 10, 12, 14, 16, 40 *Students will use TI-84 to compare the indefinite integrals (which the calculator can do but they do not yet know how to do analytically) to their analytical results found use trapezoidal sums.*
Day 15: Friday, 10 January	Antidifferentiation Exploration. F HW #42 next time: Pages 260-263/ Nos 8, 10, 16, 18, 22, 24, 26, 28, 32, 36, 42, 48, 52, 62, 64, RE
Day 16: Tuesday, 14 January	Writing about concepts assignment due today. Notes on indefinite integration. Section 4.1/Pages 248- 251/ Nos 5, 7, 9, 11, 13, 23, 27, 33, 35, 41, 43, 47, 51, 53 – 65 O ,77, 79 PEC due next class: Page 258/ No 97;Page 270/ No 84
Day 17: Thursday, 16 January	Fundamental Theorem Day & Notes on definite integration Section 4.1-3 Quiz (Open Book) Section 4.3/Pages 271-273/ Nos 5, 9, 11, 13, 15, 17, 21, 27, 29, 31, 33, 39, 43, 45, 55, 69 HW #43 due next class: Pages 271-273/ Nos 6, 8,

Chapter 3: Applications of Derivatives. What role do derivatives and limits play as a foundation for the calculus and in practical applications?

Chapter 4: Integration. How can I determine the approximate area of an irregular piece of land? How can I find the net distance traveled? How can I determine the average speed of sound over a given interval?

	28, 40, 42, 44, 52, 58, 70, 78, B:80
Day 18: Tuesday, 21 January	Written exam on Sections: P.1-6, 1.1-5, 2.1-6, 3.1-9, 4.1-3, 4.6 Oral exam: Make an appointment to come in for 20 minutes sometime this week
Free response presentations #1: 91AB4, #2: SI94M3, #4: 81AB5, #6: 88AB1, #7: 89AB4, #8: 94AB3, #9: SI94T1, #10: 95AB3, #11: 85AB5, #12: 87AB5, #14: 90AB5, #15: 86AB1, #16: 93AB1, #17: 94AB1, #18: 77AB2, #19: 81AB3, #20: 84AB4, #21: 85AB6, #22: 89AB5, #23: 90AB6, #24: AC95/96-1, #25: 91AB5, #26: SI94R2, #27: SI94T2	
Day 19: Thursday, 23 January	Notes on the Fundamental Theorem of Calculus. Geometer's Sketchpad: Exploring Calculus Section 4.4/ Pages 283-285/ Nos 1, 3, 13, 15, 19, 23, 25, 27, 31, 33, 39, 43, 47, 51 HW #44 due next class: Page 271-273 / Nos 6, 10, 18, 22, 24, 28, 32, 34, 40, 44, 46, 48, 50-70 E
Day 20: Monday, 27 January	Notes on the Second Fundamental Theorem of Calculus. Geometer's Sketchpad: Exploring Calculus Section 4.4/ Pages 285-286/ Nos 63, 67, 73, 77, 83, 87, 89, 91, 93, 97, 99, HW #45 due next class: Pages 283-286/Nos 2, 4, 10, 18, 20, 22, 24, 26, 28, 30, 34, 38, 42, 44,
Day 21: Wednesday, 29 January	Notes on integration by substitution. Section 4.4 Pages 296-298 /Nos 9, 13, 17, 21, 25, 29, 33, 37, 39, 41, 45, 49, 51 HW #46 due next class: Pages 296-298 /Nos 62, 66, 68, 72, 74, 76, 80, 82, 86, 88, 90, 92, 94, 98,
Day 22: Friday, 31 January	Section 4.4-4.5 Quiz Notes/exercises on particle motion exploration Pages 296-298 /Nos 59, 61, 63, 65, 77,83- 93 O, HW #47 due next class: Pages 296-298 /Nos 10, 16, 20, 24, 26, 30, 34, 36, 38, 40, 42, 44, 46, 52
Day 23: Monday, 3 February	Chapter 4 Quiz HW #48 due next class: Pages 296-298 58, 62, 64, 68, 70, 80, 84, 90, 94, 96, HW #49 PEC due next class: Page 308/Nos 135, 136

Chapter and Essential Questions. AP Calculus AB, Marking Period Three
Chapter 4: Integration. How accurate should an approximation be?
Why is it necessary to find the area or volume of an irregular region?
Chapter 5: Exponential Functions. Why care about logarithms? Does the model do justice to the problem?
How can I determine the population function for a given community?
Chapter 6: Applications of Integration .How can integrals be used in a variety of different ways to model physical, biological, or economic situations?

Day 1: Wednesday, 05 February	Chapter 4 Test Writing about concept assignment due on Thurs. Free Response Assignment due on Tuesday. HW # 51 due next class: Pages 318-320/ Nos 12, 16, 18, 22, 24, 28, 30, 32, 34, 38;; Page 347/ Nos 8, 26, 28, 36, 48, 62, 64, Page 356/ Nos 2, 10, 12, 16, 26, 32; 366/ Nos 2, 4, 8, 20, 22, 24, 28, 30, 32, 34;Page 377/ Nos 4, 8, 12, 16, 18, 24, 32
Day 2: Friday, 07 February	A New Function Exploration Notes on differentiation of natural logarithmic functions. Section 5.1/ Pages 318-320/ Nos 41, 47, 49, 57, 67, 69, 75, 77, 79, 81, 83, 93, 95
Day 3: Tuesday, 11 February	Writing about concept assignment due today. Notes on integration of natural logarithmic functions and Integration. Section 5.2/ Pages 327-328/Nos 5, 9, 15, 19, 25, 35, 39, 45, 49, 59, 63, 69, 70 HW # 52 due next class: Page 328/ Nos 47, 49, 51, 55, 63-70
Day 4: Thursday, 13 February	Section 5.1-5.2 Quiz Exponential Function Exploration Notes on differentiation and integration of exponential functions and Integration. Section 5.4/ Pages 344-347/ Nos 33, 41, 45, 47, 53, 59, 61, 63, 65, 87, 89, 93, 97, 103, 107, HW # 53 due next class: 338/ 16, 20, 26, 32, 40, 42, 44, 50, 60, 64, 70, 72, 76, 84, 88, RE
Day 5: Monday, 17 February	Notes on inverse functions and functions with bases other than e and Applications. Section 5.3/Pages 336-337/ Nos 47, 71, 73, 75, 77, 81, 83, 89 Section 5.5/ Pages 354-356/ Nos 39, 41, 45, 49, 51, 55, 59, 63, 65, 69, 71, 79, 81, 85, 89 HW # 54 due next class: 354-356/ 40, 48, 50, 52, 60 - 74, 88, 94
Day 6 Wednesday, 19 February	Notes on differentiating and integrating inverse trigonometric functions. Section 5.6/ Pages 363-365/ Nos 41, 43, 45 - 75 O Section 5.7/ Pages 374-375/Nos 1- 17 O, 25- 55 O HW # 55 due next class: Page 384/ Nos 40-60 E Page 390/ 2, 4, 8, 12, 20 – 30 E PEC due next class: Page 370/ Nos 111, 112
Day 7: Friday, 21 February	Hand in Writing about concept assignment.

Chapter and Essential Questions. AP Calculus AB, Marking Period Three
Chapter 4: Integration. How accurate should an approximation be?
Why is it necessary to find the area or volume of an irregular region?
Chapter 5: Exponential Functions. Why care about logarithms? Does the model do justice to the problem?
How can I determine the population function for a given community?
Chapter 6: Applications of Integration .How can integrals be used in a variety of different ways to model physical, biological, or economic situations?

	Section 5.3-5.7 Quiz (Open Book) HW # 56 due next class: Pages 335-336/ Nos 1-11 O, 33-63 O, RE, Pages 374-376/ 2, 4, 8, 12, 18, 34, 54, 58, 66 – 82 E, RE. Group review problems Chapter 5 PS due next class: Page 402/ Nos 6a, 8 Review (Practice Tests) Section 5.R/Pages 402-404/Nos 9, 13, 19, 31, 33, 43, 47, 51, 59, 65, 67, 69, 71, 79, 81, 85, 89, 91
Day 8: Wednesday, 04 March	Chapter 5 Test (5.1-5.6) Free Response Assignment due next class Notes on Area between curves. Section 6.1/Pages 413-415/ Nos 3, 5, 13, 21, 25, 29, 35, 41, 45, 57, 65, 67, 70
Day 9: Thursday, 06 March	Notes on the disc method (visual demonstrations apples, pears, & eggs). Geometer's Sketchpad: Exploring Calculus Section 6.2/Pages 423-425/Nos 3, 5, 9, 11, 17, 21, 27, 31, 33, 37, 47, 67, 69, 71 HW # 61 due next class: 423-425/ 6, 14, 20, 28, 36, 44, 58, 66a, 68, 76, 78, 80, 82, 84, 88
Day 10: Monday, 10 March	Notes on cross sections and the shell method. Geometer's Sketchpad: Exploring Calculus Section 6.2/ Pages 423-425/ Nos 61, 63; 7.3/ 472/ 3, 7, 13, 21, 27, 41, 45, 47, 49 HW # 62 due next class: 463/ 2, 6, 10, 12, 18, 22, 28, 32, 34, 38, 52, 68, 70, 72,
Day 11: Wednesday, 12 March	Cooperative Group Review problems (transparency and handout) HW # 63 due next class: Pages 471-472/ Nos 2; Pages 472/ Nos 4, 10, 14, 22, 28, 42, 46, 48, 50,
Day 12: Friday, 14 March	Pound Cake Day: A Piece of Cake Problem 6.R/ 4Pages 71-472/ Nos 3, 7, 11, 19, 21, 23, 29,30 Chapter 6&7 PS due next class: Pages 515/Nos 2, 6
Day 13: Tuesday, 18 March	Group review problems (transparency) Interim Progress Report Due and class discussion
Day 14: Thursday, 20 March	Chapter 6 Test (Sections 6.1-6.3)
Day 15: Monday, 24 March	Review Review (Practice Tests, 10-11)
Day 16: Wednesday, 26 March	Marking Period Three (Sections4.1-4.6, 5.1-5.7, 7.1-7.3)
Day 17: Friday, 28 March	Notes on Slope Fields & Euler's Method (8^{th} Edition)

Chapter and Essential Questions. AP Calculus AB, Marking Period Three
Chapter 4: Integration. How accurate should an approximation be?
Why is it necessary to find the area or volume of an irregular region?
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How can I determine the population function for a given community?
Chapter 6: Applications of Integration .How can integrals be used in a variety of different ways to model physical, biological, or economic situations?

	Geometer's Sketchpad: Exploring Calculus Section 6.1/Page 409/ NOS 5, 11, 13, 23, 27, 33, 43, 45, 47, 49, 57, 59, 63, 69, 93 HW # 64 due next class: 409/ 6, 12, 14, 24, 28, 34, 44, 46, 48, 50, 58, 60, 64, 70, B: 92
Day 18: Tuesday, 01 April	Notes on growth and decay applications (8th Edition) Section 6.2/ Page 418/ NOS 1, 5, 7, 11, 15, 17, 23, 27, 33, 39, 41, 45, 51, 53, 59, 61 HW # 65 due next class: 418/ 6, 8, 12, 16, 20, 24, 28, 34, 40, 42, 46, 52, 54, 60, 62, B; 64
Day 19: Monday, 07 April	Notes on Differential Equations. (8th Edition) Section 6.3/ Page 429/ NOS 1, 5, 7, 9, 13, 15, 19, 23, 25, 45, 47, 53 HW # 66 due next class: Pages 374-375/ Nos 2, 6, 8, 12, 14, 16, 24, 26, 46, 48, B: 54
Day 20: Wednesday, 09 April	PRACTICE EXAM
Day 21: Monday, 11 April	PRACTICE EXAM: Multiple Choice
Day 22:Wednesday 13, April	PRACTICE EXAM: Free Response Class Day

Essential Questions AP Calculus, Marking Period Four

Chapter 6: How can I calculate the volume of a metal ring used in manufacturing?
Chapter 8: Techniques of Integration. How can integrals be used to find the areas of known objects?
Course Review: 1. How can the integral of a rate of change be used to find the accumulated change?
Course Review: 2. How can you use your knowledge of derivatives to find the integral of a function?

Day 1: Monday, 14 April	PRACTICE EXAM: Free Response Class Day
Day 2: Thursday, 17 April	Notes on Basic Integration Rules. Section 7.1/ Pages 479-480/ Nos 2, 4, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 52, 56, 60, 64, 70, 72, 74,80 Lab Write Up due
Day 3: Monday, 21 April	Notes on integration by parts. Section 7.2/ Pages 487-488/ Nos 11, 13, 15, 17, 19, 21, 23, 27, 29, 35, 43 HW # 61 due next class: Pages 531/ Nos 12, 14, 16, 18, 20, 24, 28, 30, 36, 38, B: 44 PEC due next class: Page 412/ Nos 94-95 *Students will use their TI-84 and compare the calculator results of definite integrals to the analytical results found using integration by parts.*
Day 4: Wednesday, 23 April	Chapter 6 PS: Page 443/ Nos 2 (8th Edition) Integration review (Practice Tests) Review (Practice Tests, 12) Section 6.R/ Pages 441/ Nos 1-31 odd, 35, 41, 47; 8.R/ 589/ 1-15 odd
Day 5: *Thursday, 24 April	Receive progress report Writing Assignment 1969/1973 multiple choice review (Practice Tests) Released multiple choice Practice due next class
Day 6: Friday, 25 April	Released multiple choice Practice due next class PRACTICE EXAM: Multiple Choice
Day 7: Tuesday, 29 April	PRACTICE EXAM: Free Response
Day 8: Thursday, 01 May	AP Exam Review
Day 9: *Friday, 02 May	Calculus party AP Exam Review Movie
Day 10:Monday, 05 May	PRACTICE EXAM: Free Response Class Day
Day 11: *Tuesday, 06 May	PRACTICE EXAM: Free Response Class Day
Wednesday, 07 May—AP Calculus Exam	**Wednesday, 07 May—AP Calculus Exam**
Day 12: Tuesday, 13 May	The Dorm Room Project/ The Surface Area of a lake NJ
Day 13: Thursday, 15 May	Presentation of The Dorm Room Project/ The Surface Area of a lake NJ
Day 14:Monday, 19 May	Create Free Response Problems for next year's

Chapter 6: How can I calculate the volume of a metal ring used in manufacturing?
Chapter 8: Techniques of Integration. How can integrals be used to find the areas of known objects?
Course Review: 1. How can the integral of a rate of change be used to find the accumulated change?
Course Review: 2. How can you use your knowledge of derivatives to find the integral of a function?

	class
Day 15:Wednesday, 21 May	Create Multiple Choice Problems for next year's class
Day 16: Tuesday, 27 May	Redesign calculus page on schools website
Day 17: Monday, 09 June	Study non-standard school mathematics including, but not limited to, fractals, topology and code breaking.
Day 18: Wednesday, 11 June	Senior Exams
Day 19: Friday, 13 June	Senior Exams
Day 20: Tuesday, 17 June	Senior Exams
Day 21: Thursday, 19 June	Senior Exams
Day 22: Monday, 23 June	Party
Day 23: Wednesday, 25 June	Graduation Practice
Day 24: Friday, 27 June	Graduation

END OF COURSE PROJECTS:
Dorm Room Project
The Surface Area of a lake NJ
Create Free Response Problems for next year's class
Create Multiple Choice Problems for next year's class
The Broad Side of A Barn
Are the rich really becoming richer?
Volume of Unknown Solids
How Fast Does a Pine Tree Grow?

STUDENT ACTIVITIES: The following are summaries of two examples of activities that are done in class. Each is done in a small group and requires the students to hand in a written report. The report must include all of the mathematics that they did, list a summary of the process that they did, and be written in a clear and concise manner. They are graded on the process, the mathematics, and the writing. After each project, a different group is chosen to do a short presentation explaining their findings and written report to the class.

1) The Surface Area of a lake NJ: Each group is given access to the internet and some aerial maps. Students will spend time gathering information that will help them in this project. Once the information is gathered students will proceed with finding the surface area of the lake. They will then write down the entire process, including the Calculus behind their answer, in written English sentences. Students will make an approximation using either Trapezoidal or Riemann Sums, and then compare those analytical results to those found computationally. This comparison will be included in the report.

2) The Dorm Room Problem: Each group is presented with a letter from a college estate officer that would like to hire them to design a dormitory for a college campus. They are given specifics as to the volume of the building, the square footage of the base of the building, and the cost of the materials. They are asked to calculate the dimensions of the building and the cost of the building

that would be most economical. As part of this activity, students will be required to submit a written report that, in English, explicitly describes their steps taken in this project and how their solution came to be.

Neither of these activities specifically tells the students what it is that they need to do to accomplish the task at hand. One of the goals of many of our class projects is for the students to improve their critical thinking and problem solving skills and be able to determine how to solve open-ended questions on their own. In addition, students here will be asked to communicate their mathematical ideas in written English sentences, clearly and concisely.

AP Calculus Binder Table of Contents

Students are issued an AP Calculus Notebook at the beginning of the year for use throughout the year. The Notebook includes journal prompts, old AP Free Response & Multiple Choice questions, group activities, practice tests, contests, bonuses, etc.

I. Notes and Practice
1. Calculus Journals
2. Quotes
3. Chapter P Multiple Choice2/ Graphing
4f. Limits Extra Practice
4b. 2.1-5 Practice
5. Related Rates Notes
6. Summary of Curve Sketching
7. Summation Formulas Notes
8. Applications Notes
9f. Growth and Decay Notes
9b. What to Remember for the AP Exam
10-14. Slope Fields and Euler's Method
15-16. Calculus Poems
17. English/Calculus Notes
18-19. Lies My Calculator Told Me
20. Derivative and Integral Formulas

II. Practice Tests
1. Chapter 1 Test Part A
2-3. Chapter 1 Test Part B
4. Chapter 2 Test Part A
5. Marking Period 1 Review
6. Chapter 3 Review
7-8. Chapter 4 Review
9. Chapter 5 Test
10-11. Marking Period 1 Review
12. Chapter 7 Review
13. Integration Review
14. 1969/1973 Multiple Choice
15. Examination 1 (No calc, MC)

III. Sketchpad Activities
1. Limits Lab
2f. Jump Discontinuity Exploration
2b. 1.R Group
3f. 2.R Group
3b. f, f', f"
4. 3.R Group
5. Word Problems
6. Antidifferentiation Exploration
7f. Approximating Area under a Curve
7b. 4.R Multiple Choice
8. 4.R Group
9. A New Function Exploration
10f. Exponential Function Exploration
10b. Assorted Calculus Problems
11. 5.R Group
12. Writing
13. Reading Notes
14. AP Review 1-10
15. 6.R Practice
16f. Derivatives and Differentials
16b. A Piece of Cake Problem
17f. Dormitory
17b. Pound Cake Problems

IV. Test Prep Free Response
1. MP 1
2-4. MP 2 Individual
5-8. MP 2 Group

V. Free Response Semester 2
1-2. MP 3 Individual
3-4. 97 Free Response
5-6. MP 4 Individual
7-9. MP4 Group
10. PEC

VI. AP Review
1. Calculus I Final
2. RE
3. MC No Calculator
4. MC No Calculator, Calculator
5. Free Response
6. 93 Multiple Choice Review
7. RE 2000-01

VII. Contests
1. RE 1999
2-3. RE 2000
4. RE 2001
5-7. RE 2002, 2003
8-9. RE 1999
10-11. RE 2000
12-13. RE 2001
14-16. RE 2002

VIII. Projects ,Reading and Writing
1. The Calculus Controversy
2. Related Rates, Differentiation
3. Shoebox Project
4. Integration rules
5. U-Sub, Separation of Variables
6. Trig Integration, Exp Growth
7. Integration by Parts 1, 2
8f. Exploring Calculus
8b. Exploring Calculus
9f. Exploring Calculus
9b. Exploring Calculus
10. Exploring Calculus

Applications of Derivatives: Curves sketching--Discovery Approach.

Name_____ Date_____ Block_____

I. Turning Points /Maximum/Minimum; Concavity

A. Given the function $f(x) = 2x^2-5x+3$ find the following using any method.

Zeros _____Vertex_____ Intercept_____

Is the vertex a maximum or a minimum? _____ Explain

Is f(x) is concave up or concave down ? _____ Explain.

Store the function, its first derivative and its second derivative in your graphing calculator. Graph them one at a time to answer the following questions.

Function	$\frac{dy}{dx}$	zero of $\frac{dy}{dx}$	Vertex of y	$\frac{d^2y}{dx^2}$	Sign of $\frac{d^2y}{dx^2}$	Vertex of y is max/min
E. $y = 0.5x^2-5x$						
F. $y=-3x^2+5x+1$						

$Y_1=f(x)=2x^2-5x+3$ $Y_2 = f'(x) =$_____ $Y_3= f''(x)=$_____

What is the zero of Y_2 ? _____ Are the values of f " (x) positive or negative?___

Using the example A, predict the zero of y ' and the sign of y " after finding the vertex and concavity algebraically.

Algebraic work for B:	Algebraic work for C:
Algebraic work for D:	

Function	Vertex	Max/Min	Concavity	Zero of y '	Sign of y"
B. $y=-x^2+8x$					
C. $y=x^2+6x-4$					
D. $y=-2x^2+4x+1$					

Conjecture 1: Write a statement that relates the derivative and the max/min of a function.

Conjecture 2: Write a statement that relates the second derivative and the concavity of a function.

Conjecture 3: Write a statement that relates the sign of the second derivative and whether the zero of the first derivative is a max/min of the function.

Using the information from your conjectures. Find the vertex and concavity of the following functions

Function	Interval(s) for which f(x) is increasing	Sign of f ' (x)	Interval(s) for which f(x) is decreasing	Sign of f ' (x)	f " (x)
B. $f(x)=-x^2+2x$					
C. $f(x)=x^2+6x+5$					
D. $f(x)=-x^2+10x$					

Find the vertex and concavity of the following functions using what you have learned about the first and second derivatives.

Function	$D_x[y]$	Zero of $D_x[y]$	Vertex of y	$D_{xx}[y]$	Sign of $D_{xx}[y]$	Vertex of y is max/min
E. $y=x^2-3x$						
F. $y=-2x^2+8x+1$						

II. Increasing/Decreasing Functions

A. Graph $y = 3x^2+7x+2$ on the TI-84+. Determine the following. Graph and label y on grid A.

For which interval(s) is y increasing (use x-values to write intervals)?_____

For which interval(s) is y decreasing (use x-values to write intervals)?_____

Find $\frac{dy}{dx}$:_____ Graph and label it on grid A.

What is the sign of $\frac{dy}{dx}$ [y] on the interval(s) for which y is increasing?_____

What is the sign of $\frac{dy}{dx}$] on the interval(s) for which y is decreasing?_____

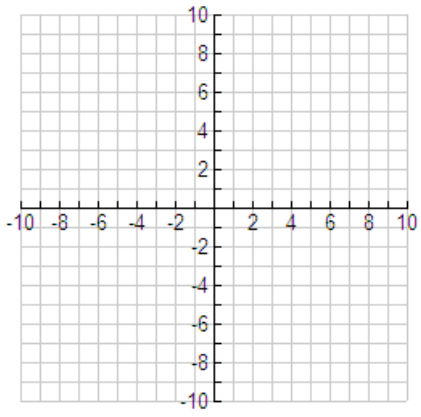
- You are being asked for the sign of the y-values on a particular intervals of x-values: choose an x-value

in the interval and replace that value for x in the derivative to determine the sign of y-values of the derivative for that interval of x-values or use the graph of the derivative to determine the sign.

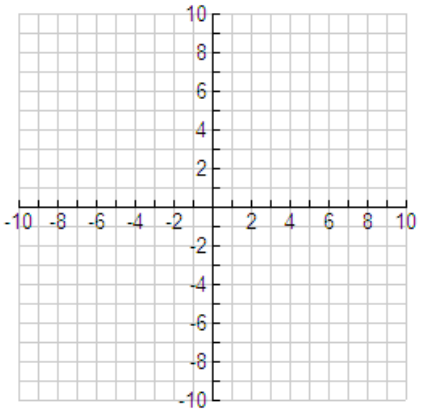
Using example A in this section, predict the sign of f '(x) after finding the interval(s) for which f(x) is increasing/decreasing graphically. Then, graph and label each function and its derivative on the corresponding grid.

Function	Interval(s) for which f(x) is increasing	Sign of f '(x)	Interval(s) for which f (x) is decreasing	Sign of f '(x)	f '(x)
B. $f(x) = x^2 + x$					
C. $f(x)= -x^2+4x+5$					
D. $f(x)= -2x^2+4x$					

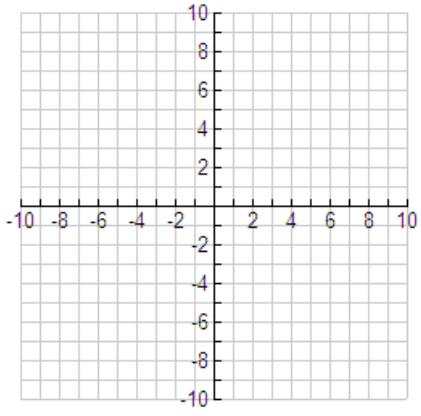
A.



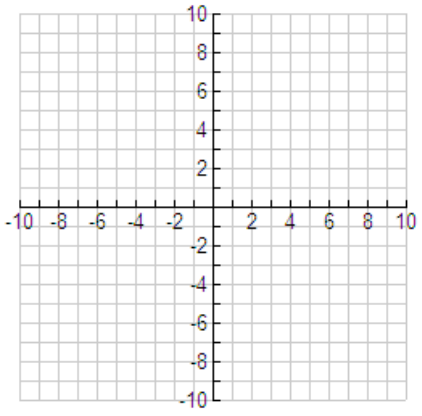
B.



C.



D.



Conjecture 4: Write a statement that relates the sign of the first derivative and whether the function increases or decreases.

Create a number line using the critical values of y= (where y==0 or dne) and what you have learned about the sign of the first derivative to determine the intervals for which the following functions are increasing/decreasing

Function	y=	Critical values of y'	y= number line to determine sign of '	Interval(s) for which y is increasing	Interval(s) for which y is decreasing
E. $y = x^2-6x+8$					
F. $y= -3x^2+2x+1$					

III. Summary of Curve Sketching

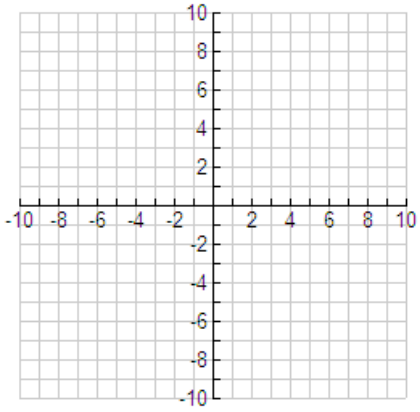
An inflection point is a point on the graph where the function changes concavity. To find possible inflection points, find the x values for which y' = 0 or does not exist. Using this information and the conjectures you have made in this activity, analyze the following functions completely.

1. $y=2x^3+3x^2-5$	y'	Critical values of y'	y' number line to determine sign of y'	Interval(s) for which y is increasing	Interval(s) for which y is decreasing
	y"	Critical values of y"	y" number line to determine sign of y"	Interval(s) for which y is CU	Interval(s) for which y CD

Use the critical values of y' and their sign in y " to determine the relative max/min(s) of y:

Use the critical values of y" to determine any inflection points of y:

Draw and label y, y' and y" on the grid.

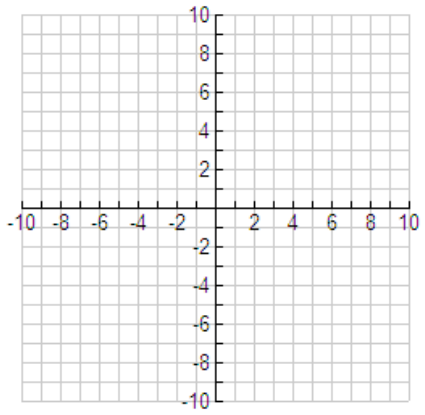


2. $y=x^4-2x^2$	y'	Critical values of y'	y' number line to determine sign of y'	Interval(s) for which y is increasing	Interval(s) for which y is decreasing
	y"	Critical values of y"	y" number line to determine sign of y"	Interval(s) for which y is CU	Interval(s) for which y CD

Use the critical values of y' and their sign in y " to determine the relative max/min(s) of y:

Use the critical values of y" to determine any inflection points of y:

Draw and label y, y' and y" on the grid.



IV. Application

A tennis court in the shape of a rectangle is to be enclosed by a fence and then divided into two junior courts by another fence joining the mid-points of the two opposite sides. If the total fenced area is to be 48 yd^2, what dimensions will minimize the length of the fence used?

(i) Draw a diagram of the rectangular plot. Label the two opposite sides x and the 3 parallel fence pieces y.

(ii) Write an equation for the area of the plot using x, y and the given area. Solve the equation for y in terms of x.

(iii) Write an equation for the total amount of fencing in terms of x and y. Call this equation P for the total perimeter of the two plots

(iv) We want to minimize P. Using the equation in (ii), rewrite P in terms of x only. In order to minimize the perimeter, differentiate P(x) with respect to x, find its critical values, and evaluate the critical value(s) in P'(x) to determine whether or not a maximum or minimum exists at the value.

(v) Since the problem asks for the dimensions, find the y value in (ii). Be sure to include units in your answer.

(vi) Choose x values less than and greater than your answer; evaluate the corresponding y values using (ii). Find the total amount of fencing required with your answer and the two dimensions you have just chosen using (iii). Does your answer minimize the length of fence used compared with the other two dimensions?