

# Math 112-004: Honors Calculus I

## Winter 2009

### Syllabus

**Professor:** Erin Chamberlain, 263 TMCB, 422-4046, [chamberlain@math.byu.edu](mailto:chamberlain@math.byu.edu)

**Office Hours:** Monday – Friday 11-12, except Tuesday, or by appointment

**Lecture:** Daily 1-1:50 in 112 TMCB

**TA:** Ryan Jenkins, [randomryan42@hotmail.com](mailto:randomryan42@hotmail.com)

**Office Hours:** Monday – Friday 3-4, and Friday 10-12 in the math lab, 159 TMCB

**Text:** *Calculus, 6E, Volume I* by James Stewart

**Course Webpage:** <http://www.math.byu.edu/chamberlain/> and <http://mathonline.byu.edu>

New announcements, copies of course materials, and other information will be posted on the course web page and on the online course webpage. Use your Route Y id to log onto the mathonline web page. The enrollment key to log onto our course is “chamberlain”.

#### Course Objectives:

1. Development of general intellectual and mathematical ability, including
  - a. The ability to learn complex, new concepts independently.
  - b. An ability to recognize and correct errors in your and others’ work.
  - c. An ability to write arguments and mathematical computations correctly and accurately.
  - d. A mastery of basic logical reasoning and an ability to write simple proofs.
  - e. The ability and confidence to attack and solve an unfamiliar problem, and the discipline to keep working on a problem until you solve it.
2. Mastery of the core topics of Math 112. The list of core topics is roughly the material in the first five chapters of the text.

**Preparation:** The prerequisites for this class are college algebra or precalculus (Math 110) and trigonometry (Math 111). If you have not had these courses either here or elsewhere, or if you did poorly in those courses (C or worse), you should probably take or retake them before taking this course.

**Pretest:** We have a (required) pretest to help you decide if you are adequately prepared to take calculus.

The pretest and a review for it can be found at the site <http://mathonline.byu.edu>. Log in with your Route-Y id and password. Click on *Pretests and placement exams*. Scroll down to your Math 112 section. The review is one link, and the exam the other. **Take care to select the 112 exam – not 119 or 110.**

When you take the pretest, you will notice at the bottom of the page a “save without submitting” button. Select this after each answer. If you lose your internet connection, you can come back and finish the quiz later. Select “submit all” when you are done with the exam.

You must finish the pretest by Saturday, January 19 at 11:00 pm. You are allowed 2 chances to pass. If your score is below 75% then you are not prepared for calculus. Talk to me or the TA about your options, and what you can do to better prepare yourself.

The pretest will be worth the equivalent of 1 quiz.

**Preparation Time:** Well prepared students should expect to spend a minimum of two hours out of class for every hour they spend in class. This adds up to a minimum of 10 hours per week on homework and studying. A minimal time commitment is likely to lead to an average grade (B-/C+ or lower). More time will be required to achieve excellence.

**Reading:** We do not have enough time to cover all of the reading material in class before the homework is due. You are expected to read the book and carefully study the examples yourself before the lecture on that material. You get more learning for your money if you read first and ask questions in class, than if I waste all of your class time reading the book to you or lecturing to you about things you could read. We will instead try to answer your questions, help you see why things are important, and fill in places that the book does not make clear.

**Assignments:** Almost every homework assignment has an online component as well as a paper component. The online component can be accessed at <http://mathonline.byu.edu> on our class webpage and is due by 11pm on the due date. The paper components will generally be collected in class three times a week on Mondays, Wednesdays and Fridays. Late homework will not be accepted.

The lowest two homework scores will not be figured into your final grade. This accommodates for minor illnesses or other disruptions to your regular schedule that might prevent you from turning an assignment in on time.

Solutions should be clearly labeled and in order. The style of your written solutions should be very much like that of a text book example; solutions should contain enough explanation so that one of your classmates would be able to easily understand what you have done. Answers given without work will receive no credit. You are welcome to study together and work together on homework assignments. However, each student must submit their own assignments. Everything you turn in should be in your own words and you should thoroughly understand everything you write down.

Homework should be done on one side of blank white paper, graph paper, or lined paper. Paper torn from a spiral notebook will not be accepted. When you turn your assignment in at the end of class, fold the paper in half lengthwise, and write your name and assignment number on the front of the “book.”

You are also required to keep an online homework journal where you will keep copies of the online assignments and your solutions to those problems. We will check these journals periodically throughout the semester.

**Recitation Sections:** The recitation sections on Tuesdays and Thursdays are designed to help you better understand the material covered in the lectures. You will learn much more if you try to do the day's homework assignment before the recitation session. This time will be used for problem sessions, weekly quizzes, and working on group projects. Each person will be given four points per problem that is correctly presented during these problem sessions. Each person should present at least two problems during the semester. These points will count as an extra homework assignment.

**Quizzes:** There will be weekly quizzes each Tuesday. These will be short tests of the material from the homework. The lowest quiz score will not be figured into your grade.

**Exams:** There will be three midterm exams during the semester. The dates will be posted on the class schedule and announced in class the week before the exam. Makeup exams will only be given for extenuating circumstances. Makeup exams must be scheduled before the regular exam date, which means you must let me know in advance, so we can schedule the exam.

**Cheating:** I highly suggest you study and work together on homework, but all of your work must be written by you in your own words. We will not tolerate any cooperation or other cheating on quizzes or exams – it is both dishonest and unfair to other members of the class. I fully support all of the University's penalties for cheating and plagiarism, which are generally an unforgivable E in the course and possible suspension from the university, as well as prosecution for any violations of the law.

Nevertheless, I believe in repentance; namely, if you have cheated, and if you, feeling remorse, tell me before you are caught, I will arrange with you some way to make restitution without suffering the above-named penalties. If you are sure that you are going to fail unless you cheat, come to me, and we will arrange an honest alternative.

**Grading:**

30%	Assignments, Projects and Quizzes
45 %	3 Midterm Exams
25 %	Final Exam

**Common Final Exam and Grades:** A common final exam is given to all students in all sections of Math 112. This assists the Mathematics Department to fairly assess students' knowledge of calculus and to assign grades fairly. The percentile ranking of each student relative to all students in all sections will be computed based on the final exam scores. Using this information the Calculus Committee will compute an average grade for each section. It is department policy that the average grade for each section should match its average grade on the common final exam. No calculators, books, or notes will be permitted during the final exam. The exam is scheduled for **Friday, April 17 at 7-10pm**. The location will be announced later.

**Math Lab:** There is a free math tutoring center in 159 TMCB. Tutors are there to help students in Math 112 as well as other classes, and there is also a computer lab open to anyone with a Route-Y id. This is a great resource. See <http://math.byu.edu/mathlab> for more information.

**Preventing Sexual Harassment:** BYU's policy against sexual harassment extends not only to employees of the university but to students as well. If you encounter sexual harassment, gender-based discrimination, or other inappropriate behavior, please talk to your professor, contact the Equal Employment Office at 422-5895 or 367-5689, or contact the Honor Code Office at 422-2847.

**Students with Disabilities:** BYU is committed to providing reasonable accommodation to qualified persons with disabilities. If you have any disability that may adversely affect your success in this course, please contact the University Accessibility Center at 422-2767. Services deemed appropriate will be coordinated with the student and instructor by that office.

Math 112 Homework Schedule -- Winter 2008

Week	Section Title	Section	Assigned Exercises	Due Date
Jan 5-9	Four Ways to Represent a Function	1.1	22, 31, 43, 55, 56, 57, 61, 64	7-Jan
	Mathematical Models	1.2	2, 4, 5, 7, 9, 12, 17	9-Jan
	New Functions from Old Functions	1.3	1, 7, 22, 28, 39, 46, 60, 65	12-Jan
Jan 12-16	Exponential Functions	1.5	11, 15, 19, 25, 29	14-Jan
	Inverse Functions and Logarithms	1.6	1, 2, 12, 16, 19, 25, 35, 54, 61, 67, 73	16-Jan
	Tangent & Velocity/Limit of a Function	2.1/2.2	p. 87: no problems; pp. 97-98: 6, 7, 9, 15, 19, 22, 27, 32	21-Jan
Jan 20-23	Calculating Limits	2.3	7, 8, 10, 15, 19, 20, 29	23-Jan
	Calculating Limits (cont.)	2.3	36, 37, 38, 39, 42, 55, 56, 58	26-Jan
Jan 26-30	The Precise Definition of a Limit	2.4	5, 7, 17, 19, 23, 24, 25, 31, 44	28-Jan
	Continuity	2.5	4, 6, 15, 18, 21, 24, 27, 31	30-Jan
	Continuity (cont.)	2.5	32, 36, 37, 39, 43(a,b), 45, 47, 49	2-Feb
	Exam 1 Review Exam 1		Jan 30-Feb 2, Late Day Feb 3	
Feb 2-6	Limits at Infinity and Asymptotes	2.6	4, 5, 7, 9, 13, 33, 43	4-Feb
	Derivatives and Rate of Change	2.7	3, 5, 9, 19, 20, 25, 46	6-Feb
	The Derivative as a Function	2.8	1, 3, 5, 6, 7, 9, 11, 19, 20, 25, 35, 36, 37, 38	9-Feb
Feb 9-13	Chapter 2 Review	Rev	p. 166 (T/F): 1, 5, 12, 17; pp. 167-168: 2, 7, 10, 13, 15, 23, 25, 29, 34, 35, 40, 48	11-Feb
	Deriv. of Polys and Exponentials	3.1	2, 13, 17, 20, 25, 28, 29, 33, 55, 61, 77	11-Feb
	The Product and Quotient Rules	3.2	2, 11, 23, 33, 47, 49, 55, 57	13-Feb
	Derivatives of Trig. Functions	3.3	9, 10, 18, 20, 35, 42, 45, 49	17-Feb
Feb 17-20	The Chain Rule	3.4	25, 37, 47, 63, 65, 71, 84, 89	18-Feb
	Implicit Differentiation	3.5	3, 11, 12, 15, 18, 21, 23, 34, 41, 57	20-Feb
	Derivatives of Log Functions	3.6	15, 17, 20, 24, 27, 33, 39, 51	23-Feb
Feb 23-27	Exponential Growth and Decay	3.8	14, 15	25-Feb
	Related Rates	3.9	33, 35, 37, 42	27-Feb
	Linear Approx./Basic Hyperbolic Fncts	3.10	1, 2, 3, 5, 33, 36, 38	2-Mar
	Exam 2 Review Exam 2		Feb 27-Mar 2, Late Day Mar 3	
Mar 2-6	Basic Hyperbolic Functions	3.11	3, 7, 9, 15, 23, 33	4-Mar
	Chapter 3 Review	Rev	p. 261 (T/F): 2, 5, 7, 11; pp. 262-263: 13, 15, 17, 28, 31, 54, 65, 69, 71, 78, 79, 80	4-Mar
	Maximum and Minimum Values	4.1	3, 7, 9, 10, 11, 13, 35, 40, 74, 76	6-Mar
	The Mean Value Theorem	4.2	1, 3, 4, 7, 13, 15, 19, 25, 29, 30, 35	9-Mar
Mar 9-13	Shape of a Graph	4.3	1, 6, 7, 21, 23, 25, 28, 31, 72	11-Mar
	Indet. Forms - L'Hospital's Rule	4.4	4, 7, 15, 33, 47, 57, 70, 71	13-Mar
	Curve Sketching	4.5	5, 12, 32, 47, 49	16-Mar
Mar 16-20	Optimization Problems	4.7	7, 14, 31, 35, 41, 47, 53, 66	18-Mar
	Newton's Method	4.8	1, 2, 3, 4, 29	20-Mar
	Antiderivatives	4.9	12, 15, 20, 27, 33, 49, 51, 53	23-Mar
Mar 23-27	Chapter 4 Review	Rev	pp. 347-348 (T/F): 1,6,10,13; pp. 348-350: 5,11,14,15,16,18,25,47,52,53,62,66,70	25-Mar
	Sigma Notation	Appdx E	1, 3, 5, 10, 11, 15, 17, 20, 23, 41, 43	27-Mar
	Areas & Distance/The Definite Integral	5.1/5.2	pp. 364-365: 1, 5, 15, 18, 21, 26; p. 376: 5(a,b), 6(a,b)	27-Mar
	The Definite Integral (cont.)	5.2	17, 18, 34, 37, 47, 49, 55	30-Mar
	Exam 3 Review Exam 3		Mar 27-30, Late Day Mar 31	
Mar 30-Apr 3	Fundamental Theorem of Calculus	5.3/Rev	pp. 387-388: 3, 9, 15; pp. 410-411: 44, 45, 47, 48, 68	1-Apr
	Fund. Theorem of Calculus (cont.)	5.3	22, 31, 36, 41, 43, 53, 57	3-Apr
	Indefinite Integrals and Net Change	5.4	4, 9, 23, 32, 43, 61, 65	6-Apr
Apr 6-10	The Substitution Rule	5.5	5, 8, 9, 18, 21, 25, 31, 38, 39,	8-Apr
	The Substitution Rule Review	5.5	47, 48, 53,73	10-Apr
Apr 13	Review			

# The online homework system

You should have been told by your instructor how to get to the website of your course. Once you have logged into your course website, you will notice a number of homework assignments listed by section. These are homework assignments that will be graded automatically by computer. You will need to complete these homework assignments along with the homework assigned in the book.

## Using the system

Some things you need to know about the Online assignments:

- Each assignment will have a deadline. Your instructor will tell you when the assignment closes. Once the assignment has closed, **you cannot enter your answers**.
- Each question for each assignment will have a submit button. There is also a “submit all and finish” button at the bottom of the page. Once you click the submit button, your grade for that problem is recorded. You can answer all of the problems at once and then click the bottom submit, or you can submit problems one at a time.
- Once you have submitted an answer to a question, the system will tell you **immediately** if it is correct. If your answer is correct, you can go onto the next problem. If it is incorrect, you can fix your answer and submit again. There is no penalty, but you must submit before the assignment closes. For most questions, you can do this as many times as you need. (If, however, you do not get it right in two tries, you are encouraged to seek help.)

## Entering answers

At the end (or, sometimes in the middle) of each question is a blank for your answer. This blank will take anything you wish to type into it. However, depending on the question, the system is expecting a specific type of answer.

**Number** Suppose the question is the following:

Find the slope of the line that passes through  $(1, 7)$  and  $(-3, 13)$ .

What is the answer? It is

$$\frac{13 - 7}{-3 - 1} = \frac{6}{-4} = -\frac{3}{2} = -1.5.$$

All of these answers will be acceptable (except the first). If you enter -1.5, the system will give you a correct answer. If you enter  $-6/4$ , however, your answer will also be correct.

**Function** Sometimes you have to enter an expression or function involving variables. For example, suppose we have the following question:

Find the equation of the line that is perpendicular to the line given by  $4x + 6y = 3$  passing through  $(1, -1)$ .

The answer is

$$y = \frac{3}{2}x - \frac{5}{2}.$$

If you are asked for the entire equation you would type  $y=3*x/2-5/2$ . If you were just asked for the function part, you would type  $3*x/2-5/2$ . Note that you could also type  $6*x/4-5/2$ , or  $-3*x/(-2)-10/4$  and would still receive full credit.

## Operators recognized by webwork

You may have noticed in the examples above that we used  $*$  for multiplication and  $/$  for division. The following table summarizes some of the operators you may find useful (in order from highest to lowest precedence).

Operator	Description	Example
!	Factorial	$5!$ represents 120
^	Exponentiation	$e^2$ represents $e^2$
**	Exponentiation	$e^{**2}$ represents $e^2$
/	Division	$5/14$ represents $\frac{5}{14}$
*	Multiplication	$5*3$ represents 15
+	Plus	$x^2+y^2$ represents $x^2 + y^2$
-	Minus	$x^2-y^2$ represents $x^2 - y^2$

Note that the webwork question uses the same order of operations that you learned in Elementary school: Exponentiation first, Multiplication/Division next, Addition/Subtraction last. If you want to change the order of operations, you need to use parentheses. For example, to typeset

$$5 + 3e^{x+4}$$

you would type  $5+3*e^{(x+4)}$ , not  $5+e^x+4$ . Since the addition is inside the exponent, it needs to be done first. We indicate that with parentheses.

## Functions recognized by webwork

The online homework system recognizes most named functions: sin, cos, ln, arcsin, tanh, etc. Some functions can be written in more than one way. For example,  $\arcsin(4x)$  can also be written as  $\text{asin}(4x)$ . If absolute values are needed, you can use the  $|$  symbol. For example,

$$|\cos^{-1}(2\pi x)|$$

can be written as  $|\text{acos}(2*\text{pi}*x)|$ . Alternatively, it can be written as  $\text{abs}(\text{acos}(2*\text{pi}*x))$ . If you need a standard function in webwork, try typing it in exactly the way it is in the book. Usually the online system will recognize it. For a more complete list of functions that the system recognizes, go to

[http://webwork.maa.org/wiki/Mathematical\\_notation\\_recognized\\_by\\_WebWork](http://webwork.maa.org/wiki/Mathematical_notation_recognized_by_WebWork)