MAC 2312: Calculus II, Fall 2020
Sections 16475, 16478, 16498

CONTACT INFORMATION:

COURSE Instructor, TAs:

Name	**Email**
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Office Hours: See Canvas Homepage

Text: There is no required text book. You may use any calculus book as reference. For instance, Calculus Early Transcendental by Stewart(solution) is a great reference book, any old edition is good. A free open source textbook, Openstax is also another good option.

Lecture Outline: You may print them off from Canvas by clicking on the Syllabus tab on the left side in Canvas, then scroll down to Course Resources to find a table of lectures and outlines, or go to the Canvas Homepage to find the link for printing all 37 lectures from 1 PDF file.

Course Management System: CANVAS

Online Homework, Quizzes, Exams: Access them using the Assignment tab in Canvas.

UF Free Tutoring Service: Broward Teaching Center

MAC 2312 -- ANALYTIC GEOMETRY & CALCULUS II

MAC 2312 Online Course Calendar, Fall 2020

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
WK 1(L1-3) 8/30	Aug 31 Lecture 1	Sept 1 LQ1, Syllabus Quiz	Lecture 2 Basic Integration	LQ2	Lecture 3 Drop/Add Deadline
WK 2(L4,5,11) 9/6 LQ3	Labor Day	L11(Calc 1 Self-Review) IBP	Lecture 4	LQ4	Lecture 5
WK 3(L6-8,12) 9/13 LQ5 Trig Integration	Lecture 6	LQ6	Lecture 7 UHW1	LQ7,Trig Sub	Lecture 8 L12(Calc 1 Self-Review)
WK 4(L9,13,14) 9/20 LQ8	Lecture 9	LQ9, L12	Lecture 10 (Review Integration)	LQ13	Lecture 13
WK 5(L10,15) 9/27 LQ10,14, PFD	Lecture 14 Practice Quiz(EC)	Improper Int. PEint(L1-10)	DIS1, UHW2, UE1R	Oct 1 Exam 1(L1-13)	Lecture 15 Homecoming
WK 6(L16-18) 10/4 LQ15, Seq	Lecture 16	LQ16	Lecture 17	LQ17	Lecture 18
WK 7(L19-21) 10/11 LQ18, GeoTelTFD	Lecture 19	LQ19	Lecture 20	LQ20, IT	Lecture 21
WK 8(L22-24) 10/18 LQ21, LCT/DCT	Lecture 22	LQ22	Lecture 23 (Review Convergence)	LQ23, AST	Lecture 24
WK 9(L25-26) 10/25 LQ24,RatioRoot	Lecture 25	PEConTests(L14-23)	DIS2, UHW3, UE2R	Oct 29 Exam2 (14-23)	Lecture 26
WK 10(L27-29) 11/1 LQ25	Lecture 27	LQ26	Lecture 28	LQ27	Lecture 29 (Review Power Series)
WK 11(L30-32) 11/8 LQ28	Lecture 30	LQ29, RIR, Taylor	Lecture 31	LQ30, TPA	Lecture 32
WK 12(L33-35) 11/15 LQ31, PE	Lecture 33	LQ32, PEPow(24-29)	Lecture 34	LQ33, UHW4	Lecture 35 (Review Polar)
WK 13 (L36)11/22 LQ34	Lecture 36	LQ35	Thanksgiving	Thanksgiving	Thanksgiving
WK 14(L37) 11/29 Polar Areas, PEPol(30-35)	DIS3,UHW5, UE3R	Dec 1 Exam3 (24-35)	Lecture 37	LQ36	LQ37
WK 15(L16-18) 12/6 Volume	PEVol(36-37)	DIS4, UHW6, UE4R	9 Verify grades	Reading Days	Reading Days

Final Exam (L1-37): December 12 (Saturday)
All exams: open from 12AM – 10PM(EST) on the date shown in this calendar, proctored by Honorlock. Decide a time to begin no later than 6pm EST (for finals, start before 5pm EST).

All homework assignments are open at the beginning of the term and due at 11:59 pm(EST) on the dates shown in this calendar.
Discussions (**Extra Credits**) (**DISn**) on Exam n material: see Discussions for more details. **UHWn, UEnR** (**upload homework, Exam Review**)

All 'Lecture n' shown here are suggested date for watching the lecture videos. You may always do more lessons, complete and submit assignments early if you have plans**, but not late. No extensions! Due date is NOT Do date**. If you wait to submit and you run into any submission issues, you will be out of luck.

Verify and resolve all Canvas grade issues and/or assignment issues either within 1 week after the grade is posted or by the last Wednesday before finals, whichever comes first (except for the final exam). Absolutely No disputes afterwards.

Extra credits assignments' due dates are not listed here. Pay attention to the Weekly Announcements for the opening/due dates.

2. INTRODUCTION

2a. COURSE DESCRIPTION and CONTENT. MAC2312, Calculus II, is the 2nd semester in a three semester calculus sequence. The course begins where MAC2311 left off at the integration techniques. This is followed by a study of infinite sequences and series, parametric equations and polar coordinates and closed with applications of definite integrals. A minimum grade of C (not C –) in MAC 2312 satisfies four credits of the University General Education Mathematics requirement.

This is an ONLINE VERSION of MAC2312 – all content is delivered online. Students view 37 online **lecture videos** and complete **lecture quizzes** in the course management system Canvas. Students also complete **online homework and upload the corresponding written work** in Canvas. Students are encouraged to **post** questions and answers on the course **Discussions Board** in Canvas. **Three unit exams** and a cumulative **final exam** are posted in Canvas and administered through Honorlock. **There is no drop of any exams. You must take an exam on the specified date.**

2b. PREREQUISITES. MAC2312 assumes that you have essential PreCalculus skills (both Algebra and Trigonometry) as well as the calculus 1 skills necessary to succeed in this course. Students should be able to do arithmetic without a calculator. In the last section of this syllabus, students may find a short list of review materials to practice as well as in L11 (limits) & L12 (L'Hospitals' Rule).

A grade of C in UF MAC2311 meets the *minimum* requirement for the course**.** We encourage students to review the prerequisite material to gain a strong knowledge in order to succeed in calculus II. MAC2312 begins with integration techniques chapter, you should already be competent in limits, differentiation and integrating simple functions such as a power function, exponentials, sine and cosine and the use of u-substitution. We strongly recommend students who are having difficulty with these core calculus skills to review MAC2311 (or take the course if you have not done so). You may switch courses on one.uf during the drop-add period.

2c. REQUIRED MATERIALS.

Lecture Notes Outlines: See 2f.

Computer access and requirements: All assignments should be taken on a computer, not cell phone or tablet, since there may be compatibility issues with CANVAS. Be sure you are using only **Chrome** that works with Honorlock. **DueDate is NOT DoDate**. Internet sometimes is not reliable, a reason you should not wait till **last hour** to complete your online assignment. If your computer or internet goes down while you try to submit an assignment, you will need additional time. If you **miss a due date**, no credit will be given for the work not submitted. Always allow plenty time to submit your work after you have prepared them thoroughly. It's **student's responsibility** to have a reliable computer, internet and good wifi speed and to verify your work is submitted successfully before the deadline.

Calculators: A graphing calculator or computer program can be useful as a learning tool when used appropriately, but they are not essential. I recommend the online graphing tool Desmos. Calculus is a collection of concepts, ideas and process that are not mastered through calculator skills. **No calculators** are allowed during exams.

2d. ASSIGNMENT CALENDAR. Check the course calendar in Syllabus for due dates and plan your schedule accordingly. **You may complete your homework early, but you must take exams on the assigned date. A 20% penalty per day is incurred for late homework submissions**. Instead of having 4 lessons due each week, we make it more flexible for you to pace yourself by having 3 lessons due for most of weeks. You may do more lessons and complete them early if you have plans for later.

NOTE: You may review a homework, but be sure not to unintentionally **re-submit** your assignment unless you mean to submit it for a grade. Canvas takes your ***last*** submission and assigns it a new grade, and if the resubmission is late, late penalty will apply. Be sure NOT submit it again if you are only reviewing.

2e. CANVAS. An UF courses management system, is located at here. Use your Gatorlink username and password to login. All course information including your grade, course syllabus, course homepage, lecture videos link, office hours, exam schedules, Honorlock, mail tool…etc. can be accessed from this site between the start and end dates of the term.

You are **responsible** for verifying that all grades are accurate. You have **one week** after a score has been posted to **resolve** **any grade concerns**. End of semester grade items need to be resolved immediately. **Contact your TA** if you believe there has been a grading or recording error. **There is absolutely no grade dispute or adjustment at the end of the term, or reopening missed assignments at later date.**

Please note: Important course information is clearly communicated in this syllabus. Assignments and course materials are easily accessible through the CANVAS. If you can not find your answer in the resources above, please use the **Discussions Board** in CANVAS to post questions and to supply answers to your fellow classmates. Your instructor may coordinate multiple classes, if you need to email your instructor for private issues, it is absolutely crucial that you write the section number and TA's name in the **SUBJECT LINE** so it can be put in the correct context.

BE SURE TO **TURN ON ALERTS/NOTIFICATION(*1)** from Canvas so that you get timely course information in your UF email.
(*1) Announcement, Discussions, Emails, Assignments …etc. For more details: see 'Start Here' module, right above 'Lecture 1' in Course Canvas Homepage.

2f. LECTURE VIDEOS. The lecture videos provide the main presentation of course material. You may access each video directly through each Lecture on Canvas Home Page. Re-watch it if necessary. Attend digital office hours if you need any help. You may also post Q & A in Discussions Board (via the Discussions tab on the left side of Canvas).

To stay current with the course, you must watch the lecture video weekly following the schedule posted in the course calendar. Start early so you don't miss the due dates.

As stated in 2d, it's possible to **get ahead** in this class if you complete each assignment early, but you must take exams on the specified dates. **If you have other commitment, adjust your schedule to complete the assignments earlier rather than later.** You should watch the lectures and answer the corresponding Lecture Quiz in Canvas before attempting homework.

Lecture Notes Outlines: It is important that you should have a paper copy of the lecture outlines. This will make it easier to take notes and to follow the lecture when watching the videos. Students should print them out from each lecture by clicking 'Syllabus' on the left hand side of Canvas, scroll down to Course Resources.

2g. SUCCESS: Other than having a **strong precalculus and calculus I background**, success in MAC 2312 depends largely on your attitude and effort. **Keeping up with the videos** is critical. You may find it beneficial to **work daily** on the material as opposed to saving it all for one day. It is not effective to watch video and copy notes without following the thought processes involved in the lecture. For that reason, there are **Lecture Quizzes** for each lecture which you will need to submit the answer in Canvas as part of your course grade. (see 2f and 3d)

EXPECTATION: This is a very challenging course. **Treating it as anything less than that is inherently unwise, both for your learning and for your grade.** Be aware that much of the learning of mathematics at the university takes place **outside of the classroom** (in the case of an online class, additional time working on the material is needed after watching the lecture videos). "**At a minimum**" we expect students to spend 3 hours effectively studying on your own (in addition to watch the lecture video) for every credit hour of the course. MAC 2312 is a 4 credit course, which means **at least** 12 hours per week preparing and practicing problems for this course **in addition to watch lecture videos**. If you are not doing as well as you would have liked, you may need to put forth more effort. Keep in mind that the goal is to be able to apply the techniques of calculus to problems, not just reproduce the problems you see in the class.

Do you know that it takes roughly 45 lecture hours in colleges vs. roughly150 lecture hours in high school to complete a calculus course? The fact of the matter is that college course goes **3^+ times faster** and that **you probably won't do well if you don't watch lectures and practice regularly or wait till the week of the exam to start preparing for the exam.** Much of the learning is on you. **Therefore, it is critical that you keep pace with the course material and assignments each week**, Practice, practice and practice. Do not fall behind.

Use the resources available as you study! We encourage you to ask questions, seek help from online office hours, Discussions Board and the Broward Teaching Center, for free online tutoring services. Do not let misunderstandings go unanswered.

We encourage students to work together, and an important resource to facilitate **communication** in an online course is the **Discussions Board** in CANVAS. You should check the Discussions Board **regularly**, posting questions and answers. The effort of asking questions, communicating ideas with fellow students, as well as the practice of writing solutions, are **effective tools** in helping you better understand calculus concepts. This is YOUR forum, take advantage of it by participating in it.

In studying calculus, you must be careful not to let a tutor, a friend or calculator 'think' for you. Be sure to compare the material from tutors, if you use one, with the class material and ask questions to make sure that you can work out problems completely on your own before an exam. Be a responsible learner!

It's our hope that through **focused study and practice** you will gain a true appreciation for the important concepts of calculus and their application. We want you to succeed in this class! You must be positive,

proactive and keep up with the course material and take the initiative to **get help in time, before you get too far behind. Students with a positive attitude who are intellectually engaged in learning the material will get the most from the course**.

2h. STUDENTS WITH DISABILITIES. UF welcome students with disabilities into the UF programs. Students requesting classroom accommodations must first register with the Dean of Students Office Disability Resource Centr (DRC) , (352-392-8565). The DRC will provide documentation to the student who must then provide this to the instructor as soon as possible when request accommodation. (see Section 4.)

2i. ACADEMIC HONESTY.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied:

"On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Academic Honesty Guidelines: "All students are required to abide by the Academic Honesty Guidelines which have been accepted by the University. The academic community of students and faculty at the University of Florida strives to develop, sustain and protect an environment of honesty, trust, and respect. Students are expected to pursue knowledge with integrity. Exhibiting honesty in academic pursuits and reporting violations of the Academic Honesty Guidelines will encourage others to act with integrity. **Violations of the Academic Honesty Guidelines shall result in judicial action** and a student being subject to the sanctions in paragraph XIV of the Student Code of Conduct".

The mathematics department expects you to follow the Student Honor Code. We are bound by university policy to report an instance of suspected cheating to the proper authorities.

You may find the Student Honor Code and read more about student rights and responsibilities concerning academic honesty here.

In addition, we remind you that lecture videos and the interactive guided study in Google Drive are the property of the University/faculty member and may not be distributed/shared without prior permission from the coordinator and may not be used for any commercial purpose. Students found to be in violation may be subject to discipline under the Student Conduce Code.

3. GRADING

3a. COURSE GRADE. Your course grade is determined as follows:

Syllabus Quiz and Lecture Quizzes	10%
Online Homework (by topics)	5%
Online Homework (by units)	5%
Written Homework (upload)	10%
Written Exam Review (upload)	10%
3 Semester Exams + 1 cumulative Final	60%
Total:	100%

In addition, there are extra credits opportunities (see 3g).

Your course grade will be determined according to the following scale.
There will be no additional curve in this course, extra assignments for individual students to improve a grade are NOT possible.

A	90% – 100%	C	70% – < 74%
A –	87% – 90%	C – *	67% – < 70%
B +	84% – < 87%	D+	64% – < 67%
B	80% – < 84%	D	60 % – < 64%
B –	77% – < 80%	D –	50% – < 60%
C +	74% – < 77%	E	< 50%

*Note: A grade of 'C –' or lower DOES NOT give University General Education credit!
For those taking the 'S – U' option: S[> 70%] U[< 70%]
Approval of the 'S – U' option must be obtained from your instructor and approved by the registrar's office. The deadline for filing an application with the Registrar and further information about the 'S – U' option are found in the undergraduate UF Catalog.

3b. INCOMPLETE GRADES POLICY. A grade of I (incomplete) will be considered only if you meet the math department criteria. If you meet the criteria you must see the instructor before the beginning of the finals week to be considered for an I. **A grade of "I" only allows you to make up your incomplete work. You can not redo any previously completed work, nor closed work.**
Missing an exam due to **negligence**, however, will result in a minimum 10–point penalty.

3c. GETTING STARTED - START HERE: INTRODUCTORY VIDEO, SYLLABUS QUIZ.

Log in to Canvas and click on the **Start Here page**. Watch the Introductory video and then read the important information. After you feel comfortable with the course policies, take the **syllabus quiz** posted in Canvas. The syllabus quiz is to make sure you understand what is expected of you in this course. After completing the introductory part and achieve at least 80% in the syllabus quiz, you are ready to move to the main content: Lecture 1 – Lecture 37.

3d. VIDEOS AND LECTURE QUESTIONS. MAC2312 is organized into 37 lectures, each lecture has an introductory page including the concepts to be covered, things you need to do for this lecture. Go to Canvas Homepage to access each lecture. From there, you may access a copy of the note outlines, link to the **lecture videos** and link to the **homework**. Viewing the video is an important aspect of the learning process. There are several simple **Lecture Quiz** to be completed in each lecture. You need to work out these problems as you watch the video. We encourage you to use the notes as well as the videos or the Discussions Board to help answer these questions which are **not timed**, you have **2 submissions** to complete each quiz. The two lowest Lecture Quiz scores will be **dropped** to offset possible credit lost due to technical issues or a missed assignment.

NOTE: At the time of the taping, we used a specific text book. Please go by the 'topic name' and not any chapter numbers mentioned in the videos.

NOTE: There might be minor typos in some of the lecture videos. Post them in Discussion Board if clarification is needed.

3e. HOMEWORK. There are online homework as well as written homework:

1. **Online Homework** – You may access all online assignments in Canvas. Access the *Lecture Quizzes* within each lecture on Canvas homepage, access Google problems *GLC2* (Google Learning Calculus 2) the same way or, by clicking on the Assignment tab on the left side of Canvas.
2. **Written Homework** – to be uploaded in Canvas:
   There are two kinds of written homework assignments. Here, you get the opportunity to practice writing out complete math solution. The first one is the written work you did while working on the above Google problems in *GLC2*. Go to the Assignments tab in Canvas, click on 'Upload Homework (**UHWn**)'. The second one is for *exam reviews*. Click on 'Upload Exam Review (**UEnR**)' to find the past exams and exam review to work on. Scan your completely worked out solution and upload them in a **single pdf file** before due date.

   Why GLC2 and What is GLC2? Quite often, students in the online class can suffer from the lack of opportunity and ability to write mathematics and that they do not have enough resources when it comes to worked-out examples. As a result, I have created an 'Interactive Guided-Learning Calculus 2' (GLC2) in Google in hope to give students a valuable resources to guide you through the course successfully. The flow of the structure is as follows: Students will

- **LEARN** from watching the lecture videos,
- **REVIEW** the Notes and annotated Examples in GLC2,
- **PRACTICE** by working out more examples in GLC2 and writing out complete solutions,
- **TEST** their understanding by taking the multiple choice questions in GLC2 and writing out the complete solution and upload them in Canvas for the written homework grades.

In the GLC2 notes section: You will find a brief summary of each topic covered in the course follow by examples with annotated solutions and, more examples for you to practice. These more examples also have worked out solutions that is just a click away. After you have worked out all the examples, you should be ready to test your understanding by taking the *multiple choice* **Quiz** and **Practice Exam** questions. You can start as early as you have watched the first video in that unit.

These *multiple choice* questions are your homework assignments, they are arranged into (*2) ***Homework by Topics*** and ***Homework by Units***, they provide you the opportunity to review the concepts and test your understanding before exams. You are allowed to get help on any homework problems. Remember that the important thing is to learn the material well before exams.

(*2) To access these assignments, go to each lecture in Canvas Homepage, access the problems in GLC2. You will have unlimited time before due date with 2 submissions. There is 1 **drop** in the *homework by topics*, but not in *homework by units*.

Do not try to complete all assignments in one sitting; Remember: Due Date is NOT Do Date! **Start and submit early so you won't miss the deadline and have time to digest and absorb the material**.

NOTE: The purpose of homework is to practice problems in order to understand and master the material learned. Complete them before each exam. **Complete them after exams is not helpful to your learning nor your grades.**

If you are experiencing problems with logging in GLC2 in general, please contact your TA immediately, your TA is **your first contact** in the course. You may also post questions in the Discussions Board.

NOTE: Post your *math questions* to the discussions board. *Do not use email for math problems or non-private issues.*

3f. EXAMS. See 4. TESTING.

3g. EXTRA CREDIT. You have opportunity to earn additional points: Post math questions AND answer questions posted by your classmates in Discussions. See Discussions in Canvas for details. Other extra credits opportunities will be announced in the Announcements and through your TA.

3h. ADDITIONAL PRACTICE PROBLEMS. There are also problems listed at the end of each lecture in the lecture note outlines, called 'Now You Try It' (**NYTI**). These were written by the course coordinator and are designed to emphasize important concepts and provide extra practice of the lecture material. Some of them are included in the Lecture Quiz as well. NYTI problems are not graded, but it is strongly encouraged that you work them out. Solutions to NYTI are posted in the 'Lecture Notes' table in the Syllabus Tab in Canvas. There are also **277 extra practice problems** posted in Canvas under Course Resources.

4. TESTING.

There are three 90-minute unit exams and one two-hour **cumulative** final exam. The exams will be given in Canvas and administered through Honorlock. All exams are open from 12AM – 10PM EST for 22 hours. The 'available until' time is set to be 10:10pm in case you miss the 10pm mark, but a late penalty applies and a 0 grade is assigned if your exam is not submitted by 10:10pm or when your time is up, whichever comes first. For that reason, you should start your exam no later than 6pm EST (or 5pm EST for the final exam) to ensure you have maximum amount of time to work on your exam.

Make sure you are available to take the exam at the designated date.

Possible connection issues, temporary internet issues during exams:

*We offer **double time** on all exams to compensate for possible internet problems, or any other technical issues that may arise, including waiting time to communicate with the proctoring support.*

***Honorlock**: See Course Information in Canvas.* We urge you to **Livechat with Honorlock Support at least a few days prior to your exam** to confirm your connection speed and required equipment are all good. It is your responsibility to be sure that you have a reliable Ethernet internet connection and verify with the proctor for an acceptable internet speed, location & environment (ex. webcam, speaker, mic) to ensure that it meets proctoring requirements. If your answers are not received by Canvas due to your faulty connection/equipment, they are lost for good, **we are not able to take anything else to replace your lost answers**.

*Please **do not request a retake** for any exam unless you have documented evidence that your disconnect or technical issues **exceeded double time and it is not due to your negligence**. It's your responsibility to have a reliable internet connection and fast enough computer/internet speed, do a 'speed check' with Honorlock before your first exam. Do it your first week before it gets busy at Honorlock. You will not be able to request a makeup exam if problems arise due to your own negligence.*

*Please **only use Chrome** while working on math equations, it's known that math images may not be displayed properly in other search engines, and Honorlock requires Chrome to work. We will not accommodate you if you don't have Chrome. Please be sure to obtain Chrome in the first week!*

If you are uncertain as to the reliability of your internet service provider or internet connection, find a place to take your exam where the connection is reliable.

Follow the proper procedure listed in the exam description to log off the exam **before disconnect from the proctor. Failure to do so may result in a 0 on the exam. Post any concerns/questions in Discussions.**

Note: You may NOT use a calculator or any other aid for exams. Be sure to read the Honorlock documents thoroughly to understand the exam procedures before you go to a test.

4a. SEMESTER UNIT EXAMS. Each Unit Exam will be given in Canvas and scored on a scale of 0 to 70 points, consisting only multiple choice questions and possibly a few fill-in-the-blank questions. Your **exam score** is displayed immediately after your submission. The exam is **locked** after the test. You may request a 15 minutes private conference within one week after each exam to **review your exam** with your TA.

4b. FINAL EXAM. A mandatory, cumulative final exam in Canvas will be given on the date shown in the course calendar. The exam consists of multiple choice questions and possibly a few fill-in-the-blank questions and graded on a scale of 0 to 100 points. You may request 15 minutes private conference to go over your final exam within 24 hours after the exam.

4c. MAKEUP POLICIES. Exams must be taken on the exam date.

1. **Makeup – Exams**: If **serious** illness or other last minute **extenuating** emergency circumstances cause you to miss an exam, you must contact your TA within 24 hours of the exam with a valid documentation for approval to take a makeup exam. You may be denied a makeup exam if you do not have completed at least 75% of all the course work thus far and do not have completed all prior exams. Contact your TA immediately if you have court order, or during first week of the term if you have religious observance that conflicts with any scheduled exams.

2. **Other make ups**: All assignments are open since day 1. There are **no makeup** on any assignments nor extra credit opportunities.

All unit exams makeups must be completed by the **last Monday** of the semester **before the final exam**.

5. **DIVERSITY, EQUITY and INCLUSION.**

The Mathematics Department is committed to diversity and inclusion of all students. We acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements It is our intent to present materials and activities that are respectful of diversity: race, color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socioeconomic status, and any other distinguishing qualities.

6. FORMULAS YOU ARE EXPECTED TO KNOW.

This course assumes that you have a sound precalculus and calculus 1 background. The following is a summary of some important concepts used in solving calculus problems. The textbook provides a more complete review of these essential topics.

<u>COMPLETING THE SQUARE</u> $x^2 + ax + b = (x + \frac{a}{2})^2 + (b - (\frac{a}{2})^2)$

<u>LAW OF EXPONENTS</u> $a^{n+m} = a^n a^m$ $a^{n-m} = \frac{a^n}{a^m}$ $(a^m)^n = a^{mn}$

<u>PROPERTIES OF logarithms</u> $log_b|xy| = log_b|x| + log_b|y|$

$$log_b\left|\frac{x}{y}\right| = log_b|x| - log_b|y|$$

$$log_b|a^m| = m\, log_b|a|, \quad log_b|x| = \frac{\ln|x|}{\ln b}$$

<u>PARABOLA</u> $y = f(x) = ax^2 + bx + c$

Vertex $x = -\frac{b}{2a}$, $y = f(-\frac{b}{2a})$

<u>CIRCLES</u> $(x-a)^2 + (y-b)^2 = r^2$

Center (a, b), radius $= r$

<u>Derivatives</u>

$\frac{d}{dx}(\sin x) =$ $\frac{d}{dx}(\csc x) =$ $\frac{d}{dx}(\cos x) =$ $\frac{d}{dx}(\sec x) =$

$\frac{d}{dx}(\tan x) =$ $\frac{d}{dx}(\cot x) =$ $\frac{d}{dx}(\arctan x) =$

$\frac{d}{dx}(a^x) =$ $\frac{d}{dx}(e^x) =$ $\frac{d}{dx}(log_a x) =$ $\frac{d}{dx}(\ln x) =$

<u>Integrals</u>

$\int \frac{1}{x} dx =$ $\int e^x\, dx =$ $\int a^x\, dx =$

$\int \sin x\, dx =$ $\int \cos x\, dx =$ $\int \tan x\, dx =$ $\int \cot x\, dx =$

$\int sec^2 x\, dx =$ $\int csc^2 x dx =$ $\int \sec x \tan x\, dx =$ $\int \cot x csc\, x\, dx =$

$\int tan^2 x\, dx =$ $\int cot^2 x\, dx =$ $\int \frac{1}{a^2 + x^2}\, dx =$

Trig Identities

$sin^2x + cos^2x = 1$ $\qquad$ $tan^2x + 1 = sec^2x$ $\qquad$ $1 + cot^2x = csc^2x$

$sin^2x =$ $\qquad$ $\sin 2x =$

$cos^2x =$ $\qquad$ $\cos 2x =$

Know values of $\sin x$, $\cos x$, $\tan x$ at $x = 0$, $\frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}$; arctan(a) at a=0, 1, sqrt(3), 1/sqrt(3).

(know the values of the other trig. functions at these angles and know the values of all trig functions at complementary and supplementary angels of the angles above)

Chain Rules $\qquad$ $(f(g(x))' = f'(g(x))g'(x)$

Derivative of an Inverse $\qquad$ If $g = f^{-1}$, then $g'(x) =$