MAC 2312: Calculus with Analytic Geometry II
4 Credit Hours
Fall 2023 – Online

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Office Hours:	A visual and personal engagement via zoom.	See Canvas for hours and zoom links.

I–INTRODUCTION

Course Description

MAC 2312 is the second semester in the three-semester sequence MAC 2311, MAC 2312, MAC 2313 covering basic calculus. The course begins where MAC2311 left off at integration techniques. The next part of the course covers infinite sequences and series, culminating with Taylor Series and applications. MAC 2312 concludes with a study of parametric equations and polar coordinates and application of definite integration– finding volumes of solids.

This is an Online version of MAC 2312– all content is delivered online. Students view 37 online lecture videos (**L**), complete 37 lecture questions (**LQ**), 23 online homework (**HW**), 11 quizzes (**Q**), 4 exams(**Exam**). Students also upload 4 written work for exam reviews (**UER**) and are encouraged to engage in class discussion by posting questions and answers in four Discussions Boards in Canvas.

Prerequisites

MAC 2311 with a minimum grade of C or AP/IB/AICE credit for MAC 2311.

To be successful in this course, you should have mastery of precalculus algebra and trigonometry. Students should be able to do arithmetic without a calculator. It is assumed that students are proficient in standard Calculus 1 topics, including limits, continuity, differentiation, and integration (u-sub).

You may find some review materials in the last section of this syllabus as well as the review lessons L11(limits) and L12 (L'Hospitals' Rule)

Required Materials

Textbook not required for this course. For anyone who wishes to study from a textbook, a free online textbook is available at Openstx Calculus Volume 2. Additionally, you may find any edition of the Calculus textbooks by Stewart or Rogawski, and the Guided Learning Calculus 2–GLC2 helpful.

Computer access and requirements: It's the student's responsibility to have a reliable internet and computer with working webcam, mic and speaker. All assignments should be taken on a computer, not cell phone or tablet, since there may be compatibility issues with Canvas. Obtain Chrome, the browser for this course.

Lecture Note Shell required: You would need it to take notes as you watch the lecture videos. There are 3 options to obtain it. see Lecture Notes Shell.

Calculators not required. A graphing calculator and Wolframalpha are useful as a study and learning tool when used appropriately, but are not essential. Remember that Calculus is a collection of ideas that are not mastered through calculator skills.

Prepare your computer

Do the things listed below to prevent having 'unreadable math codes' in your math assignments/quizzes/exams:

- **disable acceleration** in Chrome

• Ensure you do not have too many plugins enabled for Google Chrome. Adblockers are a common cause of browser issues in Canvas.

• **Clear cache and cookies and do a restart** before taking a quiz/exam.

You may 'right click' on the unreadable math code, then click on 'open image in a new tab', the correct image will appear on the upper left corner of the new page. However, this option is not possible during a quiz/exam.

• If your answer is not received by Canvas due to faulty connection/equipment or unreadable images, they are lost for good, we are not able to take anything else to replace your lost answers. Be sure to do the steps above before taking a quiz/exam.

E-Learning Canvas: All course information including your grade, syllabus, lecture note outlines, office hours, lecture videos, mail tool, discussion forums, exam reviews ... etc. is posted on Canvas. Use your Gatorlink username and password to login.

All grades are posted in the Canvas gradebook. Your grade is your responsibility. You have exactly one week to contact your TA once your grade is posted in the gradebook. After that week, the grade is final. No additional points will be awarded to "boost" your grade.

Check Canvas Announcements regularly. Due to the volume of email instructors receive, we cannot reply to each request for information that is already posted online. If you cannot find your answer in the well publicized Canvas, post your questions in any of the 4 Discussions Boards in Canvas. Feel free to reply if you know the answer. Emails are used for personal and private requests. When you email us, please be sure to write down MAC2312– Online in the subject line in all mail correspondence.

Turn ON NOTIFICATIONS in your Canvas account so that you can receive timely alerts in your UF email. See the instructions for Canvas Notification settings.

E-mail and Canvas inbox All communication between student and instructor and between students should be respectful and professional. All official class communications will be sent only to the ufl.edu addresses or to Canvas inbox. Students are responsible for acquiring and **checking their ufl.edu email account and Canvas inboxes** regularly. Please be sure to sign your name to the end of your messages.

Lecture Videos Access lecture videos directly through each lecture on the Canvas Homepage. Re-watch them if necessary. Lecture videos provide the main presentation of course material. We will introduce you to new course material and provide examples.

Lecture Notes Shell You may find them in the table of 'lecture notes' in the Course Resources. It is important that you should have a copy, this will make it easier to take notes while watching the videos and to study for quizzes/exams. There are 3 options to access these outlines: Print them out yourself, purchase a printed packet from Target Copy (there is shipping charge if you are not in Gainesville) or download a digital copy to your tablet to take notes.

We recommend students to start Lecture Questions(LQ) immediately after each lecture and complete the LQ before the next lesson, so you are familiar with the recently covered material and not miss any due dates.

Active learning strategies involves you take notes while watching the video to facilitate your understanding and engagement with the material. It is in your interest to start watching each lecture early, staying ahead of the schedule posted in the course calendar to ensure that you have the opportunity to work collaboratively with your peers by posting your questions in Discussions. Through this approach, we hope to foster a supportive and interactive learning environment that will allow you to develop your calculus skills and deepen your understanding of the subject matter.

Getting Help We encourage you to use weekly office hours to help you stay on track and succeed. In addition to attending weekly office hours, the following aids are available:

- The Math Help Center in Little 215 is open for drop-in free assistance with homework Monday through Friday from 9:30 to 4:00. It is staffed by mathematics graduate students and undergraduate assistants.
- Academic Resources at the University of Florida offers free one-on-one and small group tutoring sessions to any UF students. They also hold reviews on the evenings before each exam and have videos of review and sample test problems. You may want to attend different hours to find tutors with whom you feel most comfortable. Check it out here for their hours and location.
- U Matter, We Care provides students in distress with support and coordination of the wide variety of appropriate resources. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. Remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.
- UF Counseling Center provides information and helps students who experiencing test-related stress and anxiety or having any other concerns.

Success in MAC 2312 depends largely on your attitude and effort.

• **Engage (participate and be proactive)** in class, office hours & Discussion.

• **Complete assignments and submit them on time.** Get an early start on all assignments. If you get stuck, watch the lecture again and/or attend office hours for timely help. Do not let questions go unanswered.

• **Keep up with the pace** of the course and do not fall behind. **Keeping up with the lecture videos is critical.** You may find it beneficial to work daily as opposed to saving it all for one day. Make a goal to have tangible daily progress.

• **This is a very challenging course. Treating it as anything less than that is inherently unwise, both for your learning and for your grade.** The general rule of thumb regarding college studying is, that for each stem class, for every hour the lecture is presented, students should spend 3 hours outside of class studying. A 4 credit calculus class, at least 12 hours of study time in addition to view the lecture video. If you are not doing as well as you would have liked, you may need to put forth more hours.

• **Be a responsible learner!** In studying calculus, you must be careful not to let a tutor, a friend or calculator 'think' for you. Make sure that you can work out the problems completely on your own after you get the help.

• 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. Be positive and keep up with the course. Students with a positive attitude are intellectually engaged in learning the material will get the most from the course.

We want you to be successful! Remember that you are the only person who can walk the path to your success. Your TA and I are there for you, but you need to stay on top of what's going on in class and take the initiative to reach out when you need help.

Students with Learning Disabilities

Students requesting exam accommodations must first register with the Dean of Students Office Disability Resource Center (DRC). This must be done as early as possible in the semester so there is adequate time to make proper accommodations.

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 conduct set forth hereinafter constitutes a violation of the Academic Honesty Guidelines (University of Florida Rule 6C1-4.017).

UF Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. We are bound by university policy to report any instance of suspected cheating to the proper authorities. In addition, we remind you that lectures given in this class are the property of the University/faculty member and may not be used for any commercial purpose. Students found to be in violation may be subject to discipline under the Student Conduct Code.

Diversity 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.

II–GRADING

Course Grade

Your course grade is determined by the unweighted total points you've earned.

PracticeQ & 37 LQ (drops 3 lowest LQ) (PracticeQ + 34 LQ)	81 points
Online Homework Group1 (drop 1 lowest) (17 HWn)	34 points
Online Homework Group2 (5 HWn)	30 points
Upload Exam Review (4 UEnR)	40 points
Quiz (drop 1 lowest) (10 Qn)	100 points
3 unit exams(100 each) & 1 cumulative final(115)	415 points
Total	700 points

Grading Scale

630-700	A	609-629	A-	588-608	B+	560-587	B
539-559	B-	518-538	C+	490-517	C	469-489	C-*
448-468	D+	420-447	D	350-419	D-	0-349	E

There will be no additional curve in this course, and extra assignments for individual students to improve a grade are NOT possible.

***Note** A grade of C- and lower DOES NOT give General Education credit!

For those take the S-U option: See the Undergraduate Catalog.

Getting Started.

Log in to Canvas and familiarize yourself with the syllabus and the information in the clickable links in Canvas. Make sure you know what is expected of you in this course. After you have done that, you are ready to begin: Watch Lecture 1 video (under "Lectures" on Canvas Homepage) and Complete its Lecture Questions (LQ1).

Lecture Questions(LQ) and Homework(HW)

You may access them within each lecture on Canvas Homepage or, by clicking on the Assignments tab on the left side of Canvas. Online homework assignments will be assigned daily. There are 37 sets of LQ and two groups of HW with a total of 23 HW sets. They are opened on the first day of the semester, untimed, open book and open notes. You have three attempts on each set, the three lowest LQ grades and one lowest HW (from group1) will be dropped at the end of the semester.

If you like to take your lesson every other day, there is a 48-hours grace period on LQ and HW. I suggest having your work submitted by the due date and use the grace period for absolute last minute emergency such as handling internet/computer issues, traveling/weather related...etc. emergency issues. **No LQ, HW assignments can be submitted after the grace period.**

It is possible to get ahead in this class if you complete your assignments early, but you must take exams on the specified dates. **If you have other commitments, adjust your schedule to complete assignments earlier than later.**

Written Homework

Upload Exam Review (UEnR). Click on UE1R for more details. The purpose of homework is to practice problems in order to understand and master the material. Complete them after quizzes/exams is not helpful to your learning nor your grades.

If you have any questions that are not addressed in the syllabus, or announcements, post them in any of the four discussions boards. Your **TA is your first contact** in the course, email your TA for personal/private concerns.

Proctored Quizzes & Exams

There are 11 quizzes and three 90-minute unit exams and one two-hour cumulative final exam. They are given in Canvas and administered through Honorlock(HL). The exams are assembly exams which open from 1AM - 11:59PM EST on the specified date, you should start your exam no later than 9pm EST (or 8pm EST for the final exam) to ensure maximum time to work on your exam. Exam dates are as follows:

- Exam 1: Thursday, September 21 (L1 – L13)
- Exam 2: Thursday, October 19 (L14 – L23)
- Exam 3: Tuesday, November 28 (L24 – L35)
- Final (Cumulative): Saturday, December 9 (L1 – L37)

Quiz and Exam questions consists of multiple choices and fill-in-the-blank questions, similar to the format in LQ and HW. All quizzes are open from day 1, you may complete and submit them early; all exams must be taken at the assigned date.

Each midterm exam is worth 100 points and the final exam is worth 115 points. No exam grades will be dropped. There are no exam retakes.

Quizzes and exams **cannot be re-open after submission. You may request a 20 minutes private conference with your TA** to review your quiz or exam within one week after your submission and, within 24 hours of your final exam submission. You may access past years' exams under the Exam Information in Canvas anytime to help studying for the finals.

Make a note of the final exam date now and please inform any interested parties (e.g. your parents) who may be making plans for you around that time (such as purchasing place tickets to fly home, etc.).

Extra Credit

You may earn up to 728 out of 700 points in the following ways:

• **DISn**– posting Q/A in DIS discussion board for each exam period. You can earn up to 8 points total by completing them on Canvas before the due date. (see DIS1 instruction page for more details)

• **PracticeE3, PracticeE4**– A practice exam will be posted for exam 3 and the final exam. You can earn up to 10 points each by completing it on Canvas before its due date.

No extra credit assignments can be submitted after the due date.

These are your only opportunities to earn extra credit this semester. No other extra credit will be offered.

One Week Policy

All grades are posted in the Canvas gradebook. Your grade is your responsibility. If you have any grade concerns, you have exactly one week to contact your TA once your grade is posted in the gradebook. After that week, the grade is final. No additional points will be awarded to "boost" your grade.

Incomplete Grade Policy

A students who has completed a major portion of the course with a passing grade but is unable to complete the final exam due to illness or emergency may be granted an incomplete grade of "I". This allows the student to complete the course within the first two weeks of the following semester. See the math department incomplete policy. If you meet the criteria, you must contact your instructor before finals week to be considered for an "I". An "I" only allows you to make up your incomplete work, not redo your work.

III–TESTING

HonorLock (HL)

All quizzes and exams are proctored by HL. You will need to **obtain Chrome** and **download the Honorlock Chrome Extension**. You also need to livechat with Honorlock to do a **speed check** a few days prior to your quiz/exam to confirm your connection speed and required equipment (ex. webcam, speaker, mic) are good.

• If your answer is not received by Canvas due to faulty connection/equipment or unreadable math codes, etc., they are lost for good, we are not able to take anything else to replace your lost answers. Be sure to **do the steps in 'Prepare your computer'** before taking a quiz/exam.

Important Quiz & Exam Policies

MAC 2312 requires that students take exams on the listed dates. Students with conflicts, including regularly scheduled classes or traveling, must make advanced arrangements to be able to take the exams on the specified dates. Students may take quizzes early prior to the specified due dates.

The following applies to all proctored quizzes and exams:

• Students are responsible for material covered in lectures, NYTI and assignments.

• You may bring up to 10 blank scratch paper, you must show both sides of each blank paper to the camera. You must bring an official picture ID (UF Gator One Card or your state driver's license, Passport).

• Cell phones and other electronic devices must be turned off and put away out of sight and out of reach.

• **Double Time** is offered on all quizzes and exams. Take your time to do well.

Make-up Policy

Exam must be taken on the exam date; all pre-approved makeup quiz and makeup exam will take place on the **last Monday** of the semester. There is no re-take nor makeup after you have started the quiz/exam. No makeup is possible if you have not completed **at least 75%** of each assignment group thus far.

• **Exam Conflicts.** (a) If you are taking more than 3 exams on the same date and MAC2312 is the lower course number, or (b) If you are participating in a UF sponsored event, religious observance, or have plans made before the start of the semester, you may request for an exam makeup. **The deadline to sign up for a makeup is the end of the second week.** There is a 10% penalty if your request is after the second week.

• **Make-up Quizzes and Exams. If illness or other extenuating circumstances** outlined in the UF Attendance Policies cause you to miss a quiz or an exam, contact your instructor within 24 hours by email. Then, contact the Dean of Students office CARE Team. Once we receive notice from the CARE team, students will be signed up to take a makeup.

• **Missing an exam or quiz.**: A 10% penalty applies when you miss an exam/quiz due to negligence (no valid documentation). An arrangement must be made within one week of the scheduled quiz or exam, otherwise a grade becomes a 0.

• **Make-up LQ, HW, UEnR.** There are no make-ups. (These assignments are open on the first day of the term and, there are 3 drops on LQ, 1 drop on HW(Group 1) and 1 drop on Quiz. Additionally, there are 48-hours grace period for LQ and HW.)

• **Technical Issues. Personal computer issues will NOT be a reason to offer any type of extension nor makeups.** If you have any issues accessing the online homework, please contact the UF Help Desk or call (352)392-HELP immediately and acquire a ticket number with date and time stamp. Then email your TA immediately and find another reliable computer. Whatever you do, do not just sit and wait for a response. Since you have not waited till the last hours, you should have time to fix the problems, complete your work before work is due.

If you are seeing a bunch unreadable **math codes** and not the correct **math symbols**, that means you have not done the steps listed in Prepare Your Computer. Those points are lost for good.

Do not try to complete an assignment in one sitting; start early instead of waiting until the due date to avoid missing the deadline. Remember that the **Due Date** is not the **Do Date**. DO NOT wait until the last hour to complete your assignment since internet/computer/weather sometimes is not reliable, and no extension nor makeup will be offered due to these issues.

- **Make-up Extra Credit.** no make-ups on any extra credit assignments.

IV–EVALUATION

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at here. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via Bluera. Summaries of course evaluation results are available to students at Results.

Note: Information in this syllabus is subject to change. Any changes will be clearly announced in class or through e-mail.

MAC 2312 Online Course Calendar, Fall 2023

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Wk 1**(L1-3)** 8/21			23 **Class Begin** L1/LQ1	L2/LQ2	L3/LQ3 HW1(L1-2)	
Wk 2**(L4-6)** 8/28	L4/LQ4 Practice Quiz	L5/LQ5	L6/LQ6	HW2(L3-4) Q1(L1-4)	HW3(L5-6) MakeupReqDue	
Wk 3**(L7-9)** 9/4	L7/LQ7	L8/LQ8	L9/LQ9		HW4(L7-9)	
Wk4**(L10-13)** 9/11	L10/LQ10	L11/LQ11, L12/LQ12	L13/LQ13	Q2(L5-8)	HW5(L13)	
Wk 5**(L14)** 9/18	HW6(L1-13)	UE1R Q3(L9-13)	DIS1	**Exam1 (L1-13)**	L14/LQ14	
Wk 6**(L15-17)** 9/25	L15/LQ15	L16/LQ16	L17/LQ17	HW7(L14-15) Q4(L14-15)	HW8(L16-17)	
Wk 7**(L18-20)** 10/2	L18/LQ18	L19/LQ19	L20/LQ20 HW9(L18)	HW10(L19) Q5(L16-19)	HW11(L20)	
Wk 8**(L21-23)** 10/9	L21/LQ21	L22/LQ22	L23/LQ23		HW12(L21-22)	
Wk 9**(L24)** 10/16	HW13(L14-23)	UE2R Q6(L20-23)	DIS2	**Exam2 (L14-23)**	L24/LQ24	
Wk10**(L25-27)** 10/23	L25/LQ25	L26/LQ26	L27/LQ27	HW14(L24)	HW15(L25-26) Q7(L24-25)	
Wk11**(L28-30)** 10/30	L28/LQ28	L29/LQ29	L30/LQ30	HW16(L27-28) HW17(L28-29)	HW18(L24-29) Q8(L26-29)	
Wk12**(L31-33)** 11/6	L31/LQ31	L32/LQ32	L33/LQ33		HW19(L30-31)	
Wk13**(L34-35)** 11/13	L34/LQ34	L35/LQ35 Q9(L29-33)	HW20(32-34)	HW21(L30-35) Q10(L34-35)	**PracticeE3** UE3R	
Wk14 11/20	DIS3	**Exam3 (L24-35)**				
Wk15**(L36-37)** 11/27	L36/LQ36	L37/LQ37		HW22(L36-37)	HW23(Rev36-37)	
Wk16 12/4	**PracticeE4**	U E4R Q11(L36-37)	DIS4 **Class End** Verify grades			**Finals (L1-37)**

All quizzes & exams: open from 1AM – 11:59PM,EST, proctored by Honorlock. Begin exam no later than 9pm EST (no later than 8pm EST for finals). **E**xams must be taken on the day shown here.
Calculus 1 Review lessons: L11 (limits), L12 (L'Hospitals' Rule). Mini unit review lessons L10, 23, 35.

- All work except for exams, are open at the beginning of the term and due at 11:59 pm on the dates specified here.
- Ln-Watch lecture n video first; LQn- answer questions related to the lecture after watching the video. HW-homework practice on material learned. UEnR-Upload exam n review.
- DISn-Discussions on Exam n material: see DIS1 instruction page for details.
- Due date is NOT Do date. If you wait to submit and you run into any issues, you will be out of luck. Aim to submit assignments prior to the due dates and make sure submission is completed.

General Formulas

1. $\dfrac{d}{dx}[c] = 0$
2. $\dfrac{d}{dx}[cf(x)] = cf(x)$
3. $\dfrac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$
4. $\dfrac{d}{dx}[x^n] = nx^{n-1}$
5. $\dfrac{d}{dx}[f(x)g(x)] = f(x)g'(x) + g(x)f'(x)$
6. $\dfrac{d}{dx}\left[\dfrac{f(x)}{g(x)}\right] = \dfrac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$
7. $\dfrac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$

Exponential and Logarithmic Functions

8. $\dfrac{d}{dx}[e^x] = e^x$
9. $\dfrac{d}{dx}[a^x] = a^x \ln x$
10. $\dfrac{d}{dx}[\ln|x|] = \dfrac{1}{x}$
11. $\dfrac{d}{dx}[\log_a x] = \dfrac{1}{x \ln a}$

Trigonometric Functions

12. $\dfrac{d}{dx}[\sin x] = \cos x$
13. $\dfrac{d}{dx}[\cos x] = -\sin x$
14. $\dfrac{d}{dx}[\tan x] = \sec^2 x$
15. $\dfrac{d}{dx}[\cot x] = -\csc^2 x$
16. $\dfrac{d}{dx}[\sec x] = \sec x \tan x$
17. $\dfrac{d}{dx}[\csc x] = -\csc x \cot x$

Inverse Trigonometric Functions

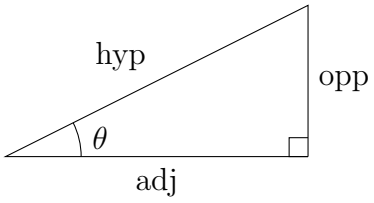
18. $\dfrac{d}{dx}\left[\sin^{-1} x\right] = \dfrac{1}{\sqrt{1-x^2}}$
19. $\dfrac{d}{dx}\left[\cos^{-1} x\right] = -\dfrac{1}{\sqrt{1-x^2}}$
20. $\dfrac{d}{dx}\left[\tan^{-1} x\right] = \dfrac{1}{1+x^2}$
21. $\dfrac{d}{dx}\left[\cot^{-1} x\right] = -\dfrac{1}{1+x^2}$
22. $\dfrac{d}{dx}\left[\sec^{-1} x\right] = \dfrac{1}{x\sqrt{x^2-1}}$
23. $\dfrac{d}{dx}\left[\csc^{-1} x\right] = -\dfrac{1}{x\sqrt{x^2-1}}$

Common Integration Formulas

1. $\displaystyle\int f'(g(x))g'(x)\,dx = f(g(x)) + C$
2. $\displaystyle\int u\,dv = uv - \int v\,du$
3. $\displaystyle\int x^n\,dx = \frac{x^{n+1}}{n+1} + C, n \neq -1$
4. $\displaystyle\int \frac{1}{x}\,dx = \ln|x| + C$
5. $\displaystyle\int e^x\,dx = e^x + C$
6. $\displaystyle\int a^x\,dx = \frac{a^x}{\ln a} + C$
7. $\displaystyle\int \ln x\,dx = x\ln x - x + C$
8. $\displaystyle\int \sin x\,dx = -\cos x + C$
9. $\displaystyle\int \cos x\,dx = \sin x + C$
10. $\displaystyle\int \sec^2 x\,dx = \tan x + C$
11. $\displaystyle\int \csc^2 x\,dx = -\cot x + C$
12. $\displaystyle\int \sec x\tan x\,dx = \sec x + C$
13. $\displaystyle\int \csc x\cot x\,dx = -\csc x + C$
14. $\displaystyle\int \tan x\,dx = \ln|\sec x| + C$
15. $\displaystyle\int \cot x\,dx = \ln|\sin x| + C$
16. $\displaystyle\int \sec x\,dx = \ln|\sec x + \tan x| + C$
17. $\displaystyle\int \csc x\,dx = -\ln|\csc x + \cot x| + C = \ln|\csc x - \cot x| + C$
18. $\displaystyle\int \sec^3 x\,dx = \frac{1}{2}(\sec x\tan x + \ln|\sec x + \tan x|) + C$
19. $\displaystyle\int \csc^3 x\,dx = -\frac{1}{2}(\csc x\cot x + \ln|\csc x + \cot x|) + C$
20. $\displaystyle\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\left(\frac{x}{a}\right) + C$
21. $\displaystyle\int \frac{dx}{a^2 + x^2} = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C$
22. $\displaystyle\int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a}\sec^{-1}\left(\frac{x}{a}\right) + C$

Right Triangle Trigonometry

- $\sin\theta = \dfrac{\text{opp}}{\text{hyp}}$
- $\cos\theta = \dfrac{\text{adj}}{\text{hyp}}$
- $\tan\theta = \dfrac{\text{opp}}{\text{adj}}$
- $\csc\theta = \dfrac{\text{hyp}}{\text{opp}}$
- $\sec\theta = \dfrac{\text{hyp}}{\text{adj}}$
- $\cot\theta = \dfrac{\text{adj}}{\text{opp}}$



Trigonometric Functions of Important Angles

θ	radians	$\sin\theta$	$\cos\theta$
$0°$	0	0	1
$30°$	$\pi/6$	$1/2$	$\sqrt{3}/2$
$45°$	$\pi/4$	$\sqrt{2}/2$	$\sqrt{2}/2$
$60°$	$\pi/3$	$\sqrt{3}/2$	$1/2$
$90°$	$\pi/2$	1	0

Pythagorean Identities

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

Double Angle Identities

- $\sin(2x) = 2\sin x \cos x$
- $\cos(2x) = \cos^2 x - \sin^2 x$

Half Angle Identities

- $\sin^2 x = \dfrac{1 - \cos(2x)}{2}$
- $\cos^2 x = \dfrac{1 + \cos(2x)}{2}$