Contact Information

My Lecturer’s:

Name: ____________________________
Office: ____________________________
Office Hours: _______________________
Phone: ____________________________
Email: ____________________________

The course homepage is on Canvas at http://elearning.ufl.edu.
Tentative Course Calendar

<table>
<thead>
<tr>
<th>Week 1 (May 8–12):</th>
<th>L1–L5</th>
<th>Quiz 1 (L1–L3)</th>
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<td>Week 2 (May 15–19):</td>
<td>L6–L9</td>
<td>HW 1</td>
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<td>Week 3 (May 22–26):</td>
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<td>Week 4 (May 29–June 2):</td>
<td>L15–L16</td>
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<td>Week 5 (June 5–9):</td>
<td>L17–L20</td>
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<td>Week 6 (June 12–16):</td>
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<td>Week 9 (July 3–7):</td>
<td>L28–L30</td>
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<td>Week 10 (July 10–14):</td>
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<td>Week 11 (July 17–21):</td>
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<td>Week 12 (July 24–28):</td>
<td>L36–L37</td>
<td>Quiz 6 (L33–L37), Exam 3</td>
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<td>Week 13 (July 31–August 4):</td>
<td>Review</td>
<td>Final Exam</td>
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Holidays: May 29 and July 4

<table>
<thead>
<tr>
<th>Exam 1:</th>
<th>L1–L13</th>
<th>June 5</th>
<th>7PM–8:30PM</th>
<th>TUR L007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 2:</td>
<td>L14–L23</td>
<td>June 29</td>
<td>7PM–8:30PM</td>
<td>TUR L007</td>
</tr>
<tr>
<td>Exam 3:</td>
<td>L24–L35</td>
<td>July 26</td>
<td>7PM–8:30PM</td>
<td>TUR L007</td>
</tr>
<tr>
<td>Final:</td>
<td>L1–L37</td>
<td>August 3</td>
<td>7PM–9PM</td>
<td>CSE A101 or LIT 0121</td>
</tr>
</tbody>
</table>

- Be at the exam site at least 10 minutes early to avoid being late.
- Students arriving at the exam after 7:10PM will not be allowed in.
- Students are not allowed to leave the exam before 7:30PM.

All makeup requests must be approved by your instructor by May 16.
Lecture Topics

L1: Integration By Parts I
L2: Integration By Parts II
L3: Trigonometric Integrals I
L4: Trigonometric Integrals II
L5: Trigonometric Substitution I
L6: Trigonometric Substitution II
L7: Partial Fractions I
L8: Partial Fractions II
L9: Partial Fractions III
L10: Strategy of Integration
L11: Review of Limits
L12: Review of L’Hospital’s Rule
L13: Improper Integrals
L14: Infinite Sequences I
L15: Infinite Sequences II
L16: Summing Infinite Series I
L17: Summing Infinite Series II
L18: Integral Test
L19: Comparison Tests
L20: Alternating Series
L21: Absolute Convergence and Ratio Test
L22: Root Test
L23: Convergence Test Summary
L24: Power Series
L25: Functions as Power Series I
L26: Functions as Power Series II
L27: Taylor Maclaurin Series I
L28: Taylor Maclaurin Series II
L29: Series Summary
L30: Parametric Equations
L31: Calculus with Parametric Curves
L32: Polar Coordinates
L33: Polar Graphs and Area
L34: Area Between Polar Curves
L35: Review of Parametric and More
L36: Volume Integrals I
L37: Volume Integrals II
3 INTRODUCTION

3.1 COURSE DESCRIPTION

This is the second semester course in a three semester calculus sequence. The course begins where MAC2311 left off. Intended topics include techniques for integration (integration by parts, trigonometric functions, trigonometric substitutions, and partial fractions), improper integrals, L'Hospital's rule, infinite sequences and series, parametric equations, polar coordinates, polar representation of plane curves, and some application of integration.

A minimum grade of C (not C−) in MAC 2312 satisfies four credits of the General Education Math requirement and also satisfies the pure math portion of the State Writing and Math requirement.

3.2 PREREQUISITES

This course assumes strong prior knowledge of algebra, trigonometry and calculus I. Calculators are NOT allowed on quizzes nor exams. A list of prerequisite topics and formulas is provided at the end of this syllabus. Students must be competent with the topics on the list.

3.3 REQUIRED MATERIALS

OpenStax Calculus Volume 2. We will be using the free textbook available at https://openstax.org/details/calculus-volume-2 for this course. You can download it in PDF format from the above link, or order a print version.

Lecture note outlines. Your instructor will use a shell of the lecture notes (available at Target Copy on University Ave and online in Canvas for you to print). Bring it to each lecture.

NOTE that a calculator is NOT required and that no calculators are allowed on quizzes or exams.

3.4 E-LEARNING IN CANVAS

We use an learning management system for this class. You can access it at: http://elearning.ufl.edu/. Use your Gatorlink username and password to login. All course information including your grade, homework assignments, lecture note outlines, syllabus, make-up policy, office hours, test locations and reviews, free help information, mail tool, announcements, etc, can be accessed from this site.
3.4.1 GRADEBOOK

You are responsible for verifying that your grades are accurate. You have **one week** after a score has been posted to contact your instructor if you believe there has been an error. If you do not bring your concerns to your instructor within one week, your grades will not be adjusted. There is no grade dispute nor grade adjustment at the end of the semester.

3.4.2 MAIL

Important course information is communicated in the syllabus, in the Announcements section of Canvas, or in class. Questions you have most likely are addressed by one of these sources. If after checking you still don’t have an answer, contact your instructor.

3.4.3 ANNOUNCEMENTS

Relevant course information will be posted in Announcements on Canvas if not already stated in the syllabus. Make sure you check it regularly. It is recommended that you set up email alerts on Canvas and have these forwarded to your phone so that critical class announcements can reach you immediately.

3.5 LECTURES AND CLASS EXPECTATIONS

This class meets for four 75-minutes class periods per week. An approximate schedule for which weeks will cover which lectures and assignments and quizzes is at the beginning of this syllabus. Students are required to show up to **all** classes.

Lectures will be used to introduce you to the fundamental concepts and theory of calculus and will follow as closely as possible the lecture outlines and calendar provided in this document. Lectures serve as only one of several components of your education.

This is a very challenging course. Treating it as anything less than that is unwise, both for your learning and for your grade. MAC2312 is a 4 credit course, which means each student is responsible for spending a minimum of 12 hours per week preparing for this course **outside the classroom**. Most of this time will be spent working on homework, students are also expected to review their notes and read ahead, regularly. If you are not doing as well as you would like, 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 you will see in the future, not just reproduce the problems you see in the class.

Attending lectures is required. You are responsible for learning lecture material missed due to an absence.
3.5.1 CLASS EXPECTATIONS

Come to class prepared. Before coming to class, read the appropriate topics from the book. Make note of any definition, concepts, or examples that you did not understand. During the lecture, these concepts should become more clear. If not, you will have already formulated the question you want answered. Also, having read the section ahead of time should eliminate the need to write down everything that is put on the board, allowing you to listen more attentively.

Be familiar with your notes. Students should re-read and/or rewrite their notes regularly. Actively rework each example completed in class, making sure you understand each step. Being familiar with your notes will make it easier to complete the homework assignments and will reduce the time and anxiety of studying for exams.

Do your homework daily. Start each homework the day the material is presented in lecture. Do not wait until the last couple of days before the corresponding work is due to start an assignment. If you wait to start and run into any problems and miss a deadline, you will be out of luck.

A list of suggested homework problems is available on Canvas and it is always recommended to attempt as many problems as possible, assigned or not.

3.6 FREE HELP

Lots of resources are available to you, we want you to succeed in this class. There is no reason to struggle on your own. Do not fall behind.

- In addition to attending your lectures, visit your instructor’s office hours.

- The Broward Teaching Center Math Lab, located at SE Broward Hall, offers free tutoring. You may want to attend different hours to find the tutors with whom you feel most comfortable. For more information (hours, exam reviews, pass years exams, etc.), go to their website https://teachingcenter.ufl.edu/vsi/. You can also request free one-on-one tutoring. Students are strongly encouraged to use the Math Lab.

- Office of Academic Support offers free one-on-one and small group tutoring sessions to any UF students. See http://oas.aa.ufl.edu/programs/tutoring/ for details.

- UF Counseling Center provides information and workshops on developing Math Confidence. The center also offers counseling support in case of issues with academics, adjusting to the stress of college life, or personal challenges. Please use this resource before you get overwhelmed! Go to http://www.counseling.ufl.edu/cwc/Developing-Math-Confidence.aspx for information on math confidence and information on joining the Academic Confidence Group.
You may also speak to an advisor in your college if you are having difficulties. You may contact the center at http://www.counseling.ufl.edu.

Private Tutors: If after availing yourself of these aids, you feel you need more help, you may obtain a list of qualified tutors for hire (not free) at http://www.math.ufl.edu. Search for “tutors”.

3.7 SUCCESS

Engage (participate and be proactive) in class, Complete assignments on time (practice, practice), Keep pace with the course, Utilize help. Do NOT Fall Behind.

Success in MAC 2312 depends largely on your attitude and effort. Attendance and participation in class is critical. It is not effective to sit and copy notes without following the thought processes involved in the lecture or during office hours. For example, you should try to answer the questions posed in the lecture, at least mentally. Students who do not actively participate generally have greater difficulty. Review notes and complete assignment daily as opposed to saving it all for one day.

Be aware that much of the learning of mathematics at the university takes place outside of the classroom. You need to spend time reviewing the concepts of each lecture before you attempt homework problems. It is also important to spend time looking over the textbook sections to be covered in the next lecture to become familiar with the vocabulary and main ideas before the next class. That way you will better be able to grasp the material presented by your lecturer. As with most college courses, you should expect to spend a minimum of 3 hours working on your own for every hour of classroom instruction (at least 12 hours per week). It takes roughly 39 lecture hours in colleges vs. 142 lecture hours in high school to complete a calculus course. While fall and spring semesters are 15 weeks, summer C is only 13 weeks.

Students are strongly encouraged to work together, discuss concepts and misconceptions together. Students learn by asking questions, and learn by helping each other. It helps the students’ engagement outside of class, helps students work through problems and learn together. You get your questions answered quickly, instead of waiting for office hours or the next lecture. It’s a good way for students to collaborate, and the exchanges you have help you be more engaged in the course and be more prepared and confident in the classroom and during exams.

The effort of asking questions and communicating ideas clearly, as well as the practice of writing solutions, are effective tools in helping you better understand calculus concepts. This type of cooperative learning is encouraged, but be sure it leads to a better conceptual understanding. You must be able to work through the problems on your own, do not let a tutor, a friend or a calculator ‘think’ for you. Even if you work together, be it with a group or with a tutor, each student must turn in his or her own work, not a copied solution, on any collected individual assignments.
There are no dumb math questions, but you should always go over your notes first to make sure you can follow the worked out problems in the lecture. You should ask your questions by stating what you have tried and what you are stuck on to allow others better assist you. Avoid general questions like: “can you tell me how to do number 3?”

Each of us learns differently, each of us teaches differently too. If after you have done all that is suggested above, put in great effort, and you are still not doing well in class, please do not suffer on your own. Talk to your instructor and let us find out together how to better help you succeed in this class. It’s my hope that through focused study and practice, you will gain a real appreciation for the important concepts of calculus and their application.

We want you to succeed in this class! But you must be proactive and take the initiative to see us 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.

3.8 STUDENTS WITH DISABILITIES

UF welcomes students with disabilities. If you have a disability-related need accommodations in this course, you must first contact the office of the Disability Resource Center(DRC), 352-392-8565, http://www.dso.ufl.edu/drc/. Visit the DRC office as soon as possible to find out the details.

3.9 ACADEMIC HONESTY GUIDELINES

All students are required to abide by the Academic Honesty Guidelines which have been accepted by the University. 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).

The Mathematics Department expects you to follow the Student Honor Code. We are bound by university policy to report any 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 at the link http://www.dso.ufl.edu/sccr/.

In addition, we remind you that lectures given in this class are the property of the University/faculty member and may not be taped or used for any commercial purpose. Students found to be in violation may be subject to discipline under the Student Conduct Code.
When submitting written homework assignment, it must be your own individual work. Any violation will result in all parties receiving a zero for the written homework grade for the term at the minimum.

Any suspicious activities during quizzes or exams will be considered as cheating and violators will be taken to honor court where you may face automatic failure or even expulsion.

With any kind of honor code violation, at the very least, all parties involved will receive a zero for the assignment and will not be allowed to retake the assignment nor drop the course. Violations of the Academic Honesty Guidelines shall result in judicial action.

4 EXAMINATIONS

There are three 90-minute evening unit exams and one two-hour mandatory cumulative final exam. See the course calendar at the beginning of this document for the dates and time. Room locations will be posted in the Announcement in Canvas one week prior to the exams. The unit exams will be scored on a scale of 0 to 70 points and will consist of both a multiple-choice section and a free response, partial credit section (tear-off sheet). There is NO DROP for any exam. The final exam is scored on a scale of 0 to 80 points and will consist of only multiple choice questions. The registrar’s office determines which exam has priority in the case of a conflict. Missing an exam due to negligence will result in a minimum 10% grade penalty.

Students are responsible for material covered in the lecture notes (including Now You Try It (NYTI) problems that we may not have had time to work out during lecture) and all assigned work. Some sample exams are available from the Teaching Center one week before each exam. Sample exams serve as an example of the general format of the exam and gives you problems to practice. Exam coverage and format may vary from semester to semester. Exam questions definitely change each semester. Check Announcements for the detailed information for your exam this semester.

No books, notes or calculators may be used on the exams. You must bring the following to each, and nothing else:

- Your UF Gator One Card.
- #2 pencils.
- Ink Pen (To sign your test).
- Knowledge of your section number.

*It is suggested that you do not bring anything of value to the exam since YOU ARE NOT ALLOWED TO TAKE ITEMS SUCH AS BACKPACKS TO YOUR SEAT.
NO CALCULATORS ARE PERMITTED. All electronic devices, including cell phones must be turned off and put away, out of reach. If any such device rings, buzzes, or otherwise causes a distraction during the exam, punitive action will be taken. Scratch paper will be provided.

The Test Form Code, as well as your UFID, name, and section number must be encoded correctly or you will lose 1 point. You must also take the test in your assigned test location or you will lose 3 points on your exam.

You should be at the exam site at least 10 minutes early. No students will be admitted to the exam 10 minutes after the official starting time of the exam. No one will be permitted to leave the test until 30 minutes after the exam starts. Raise your hand if you have any questions or need to leave the room for an emergency. In which case, you will be escorted by an instructor.

Grades can not be disputed after they have been posted for one week.

5 GRADING

5.1 COURSE GRADE

There are a total of 410 points available, 10 of which are extra credit.

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<table>
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<tbody>
<tr>
<td>Class Participation Points</td>
<td>30</td>
</tr>
<tr>
<td>Written Homework (6 points \times 10 = 60)</td>
<td>60</td>
</tr>
<tr>
<td>In-Class Quizzes (5 points \times best 4 of 6 = 20)</td>
<td>20</td>
</tr>
<tr>
<td>Semester Exams (70 points \times 3 = 210)</td>
<td>210</td>
</tr>
<tr>
<td>Cumulative Final Exam</td>
<td>80</td>
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<tr>
<td></td>
<td>410</td>
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Use the point scale below to determine your final letter grade. The course grade is determined by the number of points you have, not by the percentage.

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

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<tr>
<th></th>
<th>360–400 pts</th>
<th>280–293 pts</th>
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<tbody>
<tr>
<td>A-</td>
<td>348–359 pts</td>
<td>268–279 pts</td>
</tr>
<tr>
<td>A</td>
<td>334–347 pts</td>
<td>254–267 pts</td>
</tr>
<tr>
<td>B+</td>
<td>320–333 pts</td>
<td>240–253 pts</td>
</tr>
<tr>
<td>B</td>
<td>308–319 pts</td>
<td>228–239 pts</td>
</tr>
<tr>
<td>B-</td>
<td>294–307 pts</td>
<td>0–227 pts</td>
</tr>
</tbody>
</table>
A grade of C− DOES NOT give Gordon Rule or General Education credit!

NOTE: We will not review disputed points at the end of the semester. All grading concerns must be settled within one week of the posting of the grades. The one exception to this is the final. You have until August 6 (one day before grades are due) to bring up any concerns you have about the grading of the final.

For information on dropping courses and withdrawals go to: http://catalog.ufl.edu/ugrad/current/regulations/info/drops.aspx#drop

5.2 WRITTEN HOMEWORK

Assignment sheets will be uploaded to Canvas at least one week prior to their due date. You are expected to write complete solutions algebraically, logically and thoroughly. These sheets are due every other week.

5.3 IN-CLASS QUIZZES

There are 6 quizzes worth 5 points each given in class. A tentative schedule of which weeks will have quizzes is at the beginning of the syllabus. The best 4 out of 6 quizzes will be counted for your course grade. If you believe that a grade is erroneous, you must discuss it with your instructor within one week of its posting. No aids may be used on the quiz.

5.4 CLASS PARTICIPATION POINTS

Part of your grade will be determined by attendance and solving problems in class. Your instructor will give more details in class.

Following university policy, you may expect a penalty for attending fewer than 75% of your classes. In addition, you will lose the opportunity to earn additional points, if available, at the end of the semester.

5.5 MAKE-UP POLICY

All make-up work must be signed up with your instructor by May 16. All make-up work must be completed by August 4.

Exams: If you have a conflict due to participation in a UF sponsored event, another assembly exam of a higher course number, or religious holiday, you need to bring your documentation to your instructor by the sign up deadline to avoid 10% penalty.
If other classes are scheduled during the exam time, university policy states that the assembly exam takes precedence over the evening class, whose instructor can not penalize students who are absent to attend the exam.

The student is responsible for knowing the room and time of a make-up exam. This information will be emailed to those who had signed up at least 3 days before the make-up date. Each student must bring his or her UF Gator One ID card to the make-up exam. Make-up exam length and content may not match the regular exam exactly, and its format is all multiple choice.

It may not be possible to schedule a make-up exam after the deadline.

Other make-up exams will be given only for extreme illness, death in the family or a court appearance. Permission should be obtained prior to the exam, and only in extenuating circumstances no later than the day of the exam.

**Quizzes:** Since two quizzes are dropped, quizzes can not be made up for any reason.

**Homework:** Unless prior arrangements are made with your instructor, late homework will not be accepted. Homework must be turned in during the class period of the collection day. If you are present in class at the time of the collection but forgot to bring your homework, you must make arrangements with your instructor before you leave the classroom that day to turn it in within 24 hours. A one point penalty will be applied to any homework turned in this way.

**H-ITT Clicker Questions:** No make-ups will be given.

### 5.6 10-MINUTE POLICY

Only the students who arrive within the first 10 minutes of class and stay the entire period will be allowed to participate in the class activities (including submitting clicker answers, taking discussion quizzes, and turning in written homework assignments).

### 5.7 RECEIVING A GRADE OF INCOMPLETE

The grade ‘I’ is never used to avoid an undesirable grade. It is used only if illness or extenuating circumstances result in a student being unable to complete the final exam by the end of the semester after having completed a major portion of the course with a passing grade. The incomplete grade of ‘I’ allows the student to complete the course within the first two weeks of the following semester. See the policy on http://www.math.ufl.edu/department/incomplete-grades/.

If you meet the criteria and you wish to take an incomplete grade, you must see your instructor during office hours at least one week before finals week to be considered. An ‘I’ only allows you to make up your incomplete work, not redo your work.
5.8 EXTRA CREDIT OPPORTUNITIES

There are no extra credits opportunities for individuals that are not available to the whole class.
PREREQUISITE MATERIAL FROM PRECALCULUS

This course assumes that you have a sound precalculus 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.

ALGEBRA

1. Basic Geometric Formulas: \((b = \text{base}, \ l = \text{length}, \ h = \text{height}, \ w = \text{width})\)
   - Triangle: area = \(\frac{1}{2}bh\)
   - Circle: area = \(\pi r^2\)   circumference = \(2\pi r\)
   - Parallelogram: area = \(bh\)
   - Rectangular box: volume = \(lwh\)
   - Sphere: volume = \(\frac{4}{3}\pi r^3\)   surface area = \(4\pi r^2\)
   - Right circular cylinder: volume = \(\pi r^2h\)   surface area = \(2\pi rh + 2\pi r^2\)
   - Right circular cone: volume = \(\frac{1}{3}\pi r^2h\)   surface area = \(\pi r\sqrt{r^2 + h^2}\)

   Facts about similar triangles
   - Pythagorean Theorem: \(x^2 + y^2 = z^2\)

   ![Similar Triangles and Pythagorean Theorem](image)

2. Basic Functions and their graphs:
   - \(f(x) = x\)   \(f(x) = \sqrt{x}\)
   - \(f(x) = x^2\)   \(f(x) = |x|\)
   - \(f(x) = x^3\)   \(f(x) = 1/x\)
   - \(f(x) = b^x\), where \(b > 0\) and \(b \neq 1\). For example: \(f(x) = 2^x\)

3. Equation of a parabola:
   - \(y = f(x) = ax^2 + bx + c\), has vertex \((h, k)\), where \(h = -\frac{b}{2a}\), and \(k = f\left(-\frac{b}{2a}\right)\)

4. Equation of a circle:
   - \((x - a)^2 + (y - b)^2 = r^2\) has radius \(r\) and center \((a, b)\).
5. Factoring:

\[ x^3 + y^3 = (x + y)(x^2 - xy + y^2) \]
\[ x^3 - y^3 = (x - y)(x^2 + xy + y^2) \]

6. Completing the Square:

\[ x^2 + ax + b = \left(x + \frac{a}{2}\right)^2 + \left(b - \left(\frac{a}{2}\right)^2\right) \]

7. Law of Exponents:

\[ x^ny^n = (xy)^n \quad x^nx^m = x^{n+m} \]
\[ x^n \div x^m = x^{n-m} \quad (x^n)^m = x^{nm} \]

8. Roots:

\[ \sqrt[n]{x} = x^{\frac{1}{n}} \quad x^{-n} = \frac{1}{x^n} \]

9. Inequalities and absolute values:

\[ |x| \leq a \iff -a \leq x \leq a \]
\[ |x| > a \iff x > a \text{ or } x < -a \]

10. Properties of logarithms:

If \( x > 0 \), then \( \log_a x = y \) if and only if \( x = a^y \).

If \( m > 0 \) and \( n > 0 \), then:
\[ \log(nm) = \log(n) + \log(m) \quad \log\left(\frac{n}{m}\right) = \log(n) - \log(m) \]
\[ \log(n^c) = c \log(n) \quad \log_b(x) = \frac{\ln x}{\ln b} \]
TRIGONOMETRY

1. Identities:

\[ \sin(-\theta) = -\sin \theta \quad \cos(-\theta) = \cos \theta \quad \tan(-\theta) = -\tan \theta \]
\[ \sin \left( \frac{\pi}{2} - \theta \right) = \cos \theta \quad \cos \left( \frac{\pi}{2} - \theta \right) = \sin \theta \quad \tan \left( \frac{\pi}{2} - \theta \right) = \cot \theta \]
\[ \sin^2 \theta + \cos^2 \theta = 1 \quad \sec^2 \theta = 1 + \tan^2 \theta \quad \csc^2 \theta = 1 + \cot^2 \theta \]

2. Sum and Difference Formulas:

\[ \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B \]
\[ \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B \]
\[ \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B} \]

3. Double Angle Formulas:

\[ \sin 2\theta = 2 \sin \theta \cos \theta \]
\[ \cos 2\theta = \cos^2 \theta - \sin^2 \theta = 2 \cos^2 \theta - 1 = 1 - 2 \sin^2 \theta \]

4. Half-Angle Formulas:

\[ \sin^2 \frac{\theta}{2} = \frac{1 - \cos \theta}{2} \quad \cos^2 \frac{\theta}{2} = \frac{1 + \cos \theta}{2} \]

5. Trigonometric Values:

<table>
<thead>
<tr>
<th>\theta</th>
<th>0</th>
<th>\pi/6</th>
<th>\pi/4</th>
<th>\pi/3</th>
<th>\pi/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>\sin \theta</td>
<td>0</td>
<td>1/2</td>
<td>\sqrt{2}/2</td>
<td>\sqrt{3}/2</td>
<td>1</td>
</tr>
<tr>
<td>\cos \theta</td>
<td>1</td>
<td>\sqrt{3}/2</td>
<td>\sqrt{2}/2</td>
<td>1/2</td>
<td>0</td>
</tr>
<tr>
<td>\tan \theta</td>
<td>0</td>
<td>\sqrt{3}/3</td>
<td>1</td>
<td>\sqrt{3}</td>
<td>undef</td>
</tr>
</tbody>
</table>

6. The value of \( \arctan x \) at \( x = 0, 1, \sqrt{3}, \frac{1}{\sqrt{3}} \).
PREREQUISITE MATERIAL FROM MAC2311

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

1. Derivative of an Inverse Function:

   If \( g = f^{-1} \), then \( g'(x) = \frac{1}{f'(g(x))} \)

2. Differentiation Rules:

   **Chain Rule:** \((f(g(x)))' = f'(g(x))g'(x)\)

   **Product Rule:** \((f(x)g(x))' = f(x)g'(x) + g(x)f'(x)\)

   **Quotient Rule:** \(\left(\frac{f(x)}{g(x)}\right)' = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}\)

3. Differentiation and Integration Formulas:

   \[
   \begin{align*}
   \frac{d}{dx}(x^n) &= nx^{n-1} \\
   \int x^n
dx &= \frac{x^{n+1}}{n+1} + C \\
   \frac{d}{dx} \ln x &= \frac{1}{x} \\
   \int \frac{1}{x}
dx &= \ln |x| + C \\
   \frac{d}{dx} e^x &= e^x \\
   \int e^x
dx &= e^x + C \\
   \frac{d}{dx} a^x &= (\ln a) a^x \\
   \int a^x
dx &= \frac{a^x}{\ln a} + C \\
   \frac{d}{dx} \sin x &= \cos x \\
   \int \cos x
dx &= \sin x + C \\
   \frac{d}{dx} \cos x &= -\sin x \\
   \int \sin x
dx &= -\cos x + C \\
   \frac{d}{dx} \tan x &= sec^2 x \\
   \int sec^2 x
dx &= \tan x + C \\
   \frac{d}{dx} \cot x &= -csc^2 x \\
   \int csc^2 x
dx &= -\cot x + C \\
   \frac{d}{dx} \sec x &= \tan x \sec x \\
   \int \tan x \sec x
dx &= \sec x + C \\
   \frac{d}{dx} \csc x &= -\cot x \csc x \\
   \int \cot x \csc x
dx &= -\csc x + C \\
   \frac{d}{dx} \arctan x &= \frac{1}{1+x^2} \\
   \int \frac{1}{1+x^2}
dx &= \arctan x + C \\
   \frac{d}{dx} [f(g(x))] &= f'(g(x))g'(x) \\
   \int f'(g(x))g'(x)
dx &= \int f(u)
du
   \end{align*}
   \]