

**MAC 2233: SURVEY OF CALCULUS
SYLLABUS
SPRING 2021**

Contact Information

Course Coordinator and Lecturer:

Dr. Missy Shabazz

Office: 374 Little Hall

Office Hours: M4, W6, R5

Email: shabazzm@ufl.edu

Discussion Leader (TA)

Name: _____

Office: _____

Office Hours: _____

Email: _____

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MAC2233 Spring 2021
Tentative Schedule

1. Course Calendar

Week 1			
1/11/21	M	L3	Linear Functions and Applications
1/13/21	W	L4	Functions and their Properties
1/15/21	F	L5	Translations and Reflections
Discussion			Intro
Week 2			
1/18/21	M		MLK Day – No Classes
1/20/21	W	L6	Polynomial Functions, Quadratic Models
1/22/21	F	L6	Polynomial Functions, Quadratic Models
Discussion	T/H		Group Work 1 (L3 – L5)
Week 3			
1/25/21	M	L7	Rational and Functions Exponential Functions
1/27/21	W	L8	Inverse and Logarithmic Functions
1/29/21	F	L9	Applications of Exponential and Logarithmic Functions
Discussion	T/H		Group Work 2 (L6 – L7)
Week 4			
2/1/21	M	L10	Introduction to Limits
2/3/21	W	L11	Evaluating Limits Algebraically, Limits at Infinity
2/5/21	F	L11	Evaluating Limits Algebraically, Limits at Infinity
Discussion	T/H		Group Work 3 (L8 – L9)
Week 5			
2/8/21	M	L12	One – Sided and Unbounded Functions, Continuity
2/10/21	W	L13	Continuity and Applications
2/12/21	F	L14	Rates of Change
Discussion	T/H		Group Work 4 (L10 – 11)
Week 6			
2/15/21	M		Review
2/16/21	T		Unit 1 Exam (5 – 10pm)
2/17/21	W	L15	Definition of the Derivative
2/19/21	F		
Discussion	T/H		Review
Week 7			
2/22/21	M	L16	Differentiability, Graph of the Derivative
2/24/21	W	L17	Basic Rules of Differentiation
2/26/21	F	L18	Derivatives of Products and Quotients
Discussion	T/H		Cancelled for Recharge Day

Week 8			
3/1/21	M	L19	The Chain Rule
3/3/21	W	L20	Implicit Differentiation
3/5/21	F	L21	Related Rates
Discussion	T/H		Group Work 6 (L17 – L19)
Week 9			
3/8/21	M	L22/L23	Derivatives of Logarithmic and Exponential Functions
3/10/21	W	L22/L23	Derivatives of Logarithmic and Exponential Functions
3/12/21	F	L24	Increasing and Decreasing Functions
Discussion	T/H		Group Work 7 (L19 – L20)
Week 10			
3/15/21	M		Review
3/17/21	W		Unit 2 Exam (5 – 10 pm)
3/19/21	F	L25	Relative Extrema
Discussion	T/H		Review
Week 11			
3/22/21	M	L26	Higher Derivatives and Concavity
3/24/21	W		Recharge Day – No Class
3/26/21	F	L27	Curve Sketching
Discussion	T/H		Group Work 8 (L25 – L26)
Week 12			
3/29/21	M	L27	Curve Sketching
3/31/21	W	L28	The Second Derivative Test
4/1/21	F		
Discussion	T/H		Review
Week 13			
4/5/21	M		Unit 3 Exam (5 – 10pm)
4/7/21	W	L29	Applications of Extrema
4/9/21	F	L30	Differentials and Linear Approximations
Discussion	T/H		Review
Week 14			
4/12/21	M	L31	The Antiderivative
4/14/21	W	L32	The Method of Substitution
4/16/21	F	L33	Area and the Definite Integral
Discussion	T/H		Group Work 9 (L29 – L30)

Week 15			
4/19/21	M		The Fundamental Theorem of Calculus
4/21/21	W		Review
4/23/21	F		Reading Day – No Classes
Discussion	T/H		Cancelled
4/26/21	M		Final Exam (5 – 10 pm)

*Exam Dates and the Final Exam Date are NOT tentative

2. Course Content

MAC 2233 is the first in the two semester sequence MAC 2233 and MAC 2234 surveying the important ideas of calculus but emphasizing its applications to business, economics, life and social sciences. The course covers important precalculus topics: basics of functions and graphing, specific functions and their applications as models (linear, quadratic, rational, exponential and logarithmic) as well as calculus: limits, differentiation, applications of the derivative, introduction to integration and its applications including area.

A minimum grade of C (**not** C-) in MAC 2233 satisfies three credits of the university General Education quantitative requirement.

3. Prerequisites

MAC 2233 assumes that you have essential precalculus skills necessary to succeed in calculus. This course does not cover trigonometry.

To enroll in MAC 2233, you must have earned a grade of C or better in MAC 1140, precalculus algebra, or MAC 1147, precalculus; earned calculus credit through an exam or earlier coursework; or have taken the ALEKS placement assessment and attained the required minimum score. You may take the ALEKS assessment through the ONE.UF homepage <https://one.uf.edu>; click on Placement under My Online Services. For more complete information, check the page <https://student.ufl.edu/>. Note the following paragraph: “The Department of Mathematics encourages you to take the assessment even if you have met one of the prerequisites for MAC 2233. You may need to review your algebra skills and your placement assessment can provide information and specific areas for additional study.”

You can check with either an advisor in your college, the MAC 2233 course coordinator, or an advisor in the math department (the main office is Little 358) to be sure that you are eligible for MAC 2233.

The textbook for MAC 2233 begins with a short review of precalculus topics. **You should already be competent in working this material.** We **strongly recommend** that students who are having difficulty with this review material consider first taking MAC 1140, a three credit review of Precalculus Algebra. You may switch courses on ONE.UF during the drop-add period. In an agreement with the registrar’s office, you have one additional week to drop back to MAC 1140. **After the drop-add period, the paperwork to move back to precalculus MAC 1140 must be completed through the math department. The deadline is Friday, January 22nd at 4PM.** See the course coordinator, Dr. Shabazz.

4. Required Materials

4.1 Textbook

Calculus with Applications, Eleventh Edition by Lial, Greenwall and Richey. The text may be accessed as an ebook through the online homework system MyMathLab.

There are two ways to purchase MyMathLab, which will be available at the start of the semester.

- You have the choice to “opt-in” to MyMathLab and the ebook. This gives you MyMathLab access for a reduced price which is added as a charge to your student account. This is the lowest priced option for purchasing MyMathLab. **The link to “opt-in” will be provided through Canvas once classes begin.**
- Students who do not “opt-in” by March 1st can purchase an access code to MyMathLab and the ebook through the UF bookstore.

It is not required, but some students prefer a hard copy of the text. If so, you may purchase from the UF bookstore a loose leaf “print upgrade” version of the ebook for \$41.25. You may also be able to find a new or used copy of the text online. But note the following:

DO NOT TRY to purchase your MyMathLab code online or directly from Pearson. Those codes will not provide access to our MyMathLab course which is accessed through CANVAS. If you are having problems accessing MyMathLab through Canvas or if your access code is showing as invalid, please contact the publisher at: allaccess@bsd.ufl.edu.

4.2 Other Required Materials

As indicated, you must purchase an access code for MyMathLab, which will include the text as an ebook.

We will be using the Top Hat (www.tophat.com) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.

You can visit the Top Hat Overview (<https://success.tophat.com/s/article/Student-Top-Hat-Overview-and-Getting-Started-Guide>) within the Top Hat Success Center which outlines how you will register for a Top Hat account, as well as providing a brief overview to get you up and running on the system.

An email invitation will be sent to you by email, but if don't receive this email, you can register by simply visiting our course website:

	Course Join Code	Unique Course URL
Period 5 (11:44 – 12:35)	174901	https://app.tophat.com/e/174901

Top Hat may require a paid subscription, and a full breakdown of all subscription options available can be found here: <https://tophat.com/pricing/>.

Should you require assistance with Top Hat at any time, due to the fact that they require specific user information to troubleshoot these issues, please contact their Support Team directly by way of email (support@tophat.com), the in app support button, or by calling 1-888-663-5491.

Calculators: For text and homework problems, a scientific calculator doing basic statistics is required. A graphing calculator or computer program such as Wolfram Alpha can be useful study and learning tools when used appropriately, but are not essential.

Remember that calculus is a collection of concepts and ideas that are not mastered through calculator skills.

5. MAC 2233 Homepage

The link <https://people.clas.ufl.edu/shabazzm/> provides basic course information. All course materials including lecture notes and announcements will be posted on Canvas.

6. Canvas

UF's course management system Canvas is accessed at <http://elearning.ufl.edu/>. Use your Gatorlink username and password to log in. All course information including homework assignments, lecture notes and reviews are posted on this site. Canvas provides a mail tool and discussion forum for communication.

All grades are posted in the Canvas gradebook (except individual TopHat points, which are accessed through TopHat website). You are responsible to verify that those grades are accurate. **You have one week after a score has been posted to contact your discussion leader to resolve any grade concerns. We will not consider grading disputes at the end of the semester. Be sure to save all original documents in case of grading questions. If you still have questions after meeting with your TA, you may contact your lecturer or Dr. Shabazz, the course coordinator.**

Please note: Important course information is clearly communicated through this syllabus, and the MAC 2233 Canvas homepage. We will update with announcements both in lecture and through Canvas. **Check regularly for announcements! These are also sent to your email so you can access on your smartphone.** Due to the volume of email your

instructors receive, we cannot reply to each request for information that is already posted online. Always check those resources first!

There is a **discussion forum** in Canvas. Please use this to post questions and to supply answers to your fellow students. Your instructors will check the discussion forum regularly and respond to questions as a way to communicate to the whole class.

7. Lectures

7.1 Lecture Classes

The lecture provides the main presentation of course material, and will follow as closely as possible the calendar and lecture outline provided in this guide. **Attendance in lecture or by zoom is required.** You are responsible for learning lecture material missed due to an excused absence.

Students can print out the lecture noteshells from Canvas. You may also purchase a hard copy from Target Copy Center. This will make it easier to take notes and to participate in lecture. Within a day after class, completed lecture notes will be available on Canvas.

Note: The lecture notes and other documents posted on Canvas are in PDF format which requires the Acrobat Reader. You may download the latest version through <http://get.adobe.com/reader/>

7.2 On-line Lectures

Starting each Friday, a lecture video will be posted in Canvas that covers an entire lecture. (See the calendar to see which lectures are recorded.) You should complete each video before the next lecture class. You are responsible for watching those videos and understanding the material presented. These lectures will be included on homework, class assignments, and exams. If you have any questions, you may ask on the discussion board in Canvas, ask during office hours, ask during discussion class, or go to the Broward Help Center on campus.

8. Discussion Section

The discussion meets either on Tuesday or Thursday, depending on your section number. During the discussion, you will be sorted into groups on zoom and given group work. The remainder of that time should be used to ask questions. Those questions may range from homework, concepts, lecture notes, etc. The discussion is your time to help clear up any concepts you might not understand.

9. Free Help and Resources

- **OFFICE HOURS.** Both your lecturer and teaching assistant have regular weekly office hours which will be announced in class and posted on the MAC 2233 homepage on Canvas. These are open hours; you do not need to make an appointment. If you have a class conflict with scheduled hours, you may make a separate appointment with your lecturer or TA. Office hours are NOT a time to reteach course material. If you must miss class, first review the lecture material from your text and class notes (available on Canvas as indicated above) and then bring specific questions to office hours.

- **TEACHING CENTER (MATH LAB),** located in SE Broward Hall, is a tutorial service staffed by trained math and science students to provide help with your calculus questions and homework. All tutoring is available online and by appointment at this time. More information visit <http://teachingcenter.ufl.edu/tutoring/tutoring-schedule/>

The Teaching Center tutors hold reviews evenings before each exam. They also provide videos of review and sample test problems. Check the webpage, <http://teachingcenter.ufl.edu/tutoring/test-reviews/> for additional information.

- **OFFICE OF ACADEMIC SUPPORT** offers free one-on-one and small group tutoring to UF students. See <http://oas.aa.ufl.edu/tutoring.aspx> for details.

- Textbooks are available on reserve at the Library. The solutions manual for the odd numbered textbook exercises is available in MyMathLab.

- **Private tutors:** If you feel that you need more individual help, you may obtain a list of qualified tutors for hire at www.math.ufl.edu. Search for “tutors”.

- **Computer and Technical Difficulties** For difficulties with computer problems, Gatorlink, etc. contact the UF Computing Help Desk at <http://helpdesk.ufl.edu> , 352-392-help.

- **UF COUNSELING CENTER** provides information and workshops on developing Math Confidence. Go to <http://www.counseling.ufl.edu/cwc/Developing-Math-Confidence.aspx> for more information or to join the Academic Confidence Group.

The center also offers counseling support in case of issues with academics, adjusting to the stress of college life, or personal challenges. You may contact the center at www.counseling.ufl.edu/cwc/ or 352-392-1575. In the case of emergency you may contact the University Police Department: 392-1111 or 9-1-1 for emergencies.

- **U Matter, We Care** Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to help. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care

Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

10. Success

Other than having a strong precalculus background, success in MAC 2233 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. For example, you should try to answer the questions posed by your lecturer. Students who do not actively participate have much more difficulty.

However, 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 look over the textbook sections to be covered in the next lecture to become familiar with the vocabulary and main ideas before 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 2 hours working on your own for every hour of classroom instruction (at least 6 hours per week).

It can also be very helpful to study with a group. 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.** Even if you work together, **each student must turn in his or her own work, not a copied solution, on any collected assignments.**

In studying calculus, you must be careful not to let a tutor, friend, or calculator “think” for you. Be sure that you can work problems completely on your own, without help, by the time of a quiz or exam.

USE THE RESOURCES AVAILABLE AS YOU STUDY! We encourage you to seek help from your lecturer and course Teaching Assistants during office hours or by appointment. We also encourage you to use the Broward Teaching Center and OAS for group and private tutoring. MyMathLab offers videos and other teaching aids.

If you are having difficulty with calculus, do not get discouraged! See your lecturer or discussion leader right away when you have questions.

Our hope is 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 keep up with the course material and take the initiative to see us and 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.

11. Students with Learning Disabilities

Students requesting class and exam accommodations must first register with the Dean of Students Office Disability Resource Center(DRC), www.dso.ufl.edu/drc/. That office will provide a documentation letter to the student to present to the course coordinator, Dr. Shabazz, in Little 485. This must be done as early as possible in the semester, **at least one week before the first exam**, so there is adequate time to make proper accommodations.

12. Academic Honesty

Remember that you committed yourself to academic honesty when you registered at the University of Florida. All students are bound to

The Honor Pledge

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code.

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 any instance of suspected cheating to the proper authorities. This includes clicker points submitted in lecture. Each student must enter his or her own response; clicking for another student is a violation of the Academic Honesty Guidelines and will be reported. Minimum penalty: zero for Class Participation Points.

You may find the Student Honor Code and read more about student rights and responsibilities concerning academic honesty at the link 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 without prior permission from the lecturer 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.

13. Grading and Course Requirements

4a. COURSE GRADE.

Assignments	
MyMathLab Homework	10%
MyMathLab Quizzes (Prerequisite MML Homework)	10%
Discussion Group Work	10%
Lecture participation points	5%
3 semester exam scores (15% each)	45%
Final exam	20%
Total:	100%

A	90% - 100%	C	67% - 72.8%
A-	87% - 89.8%	C-*	64% - 66.8%
B+	84% - 86.8%	D+	62% - 63.8%
B	80% - 83.8%	D	57% - 61.8%
B-	76% - 79.8%	D-	56% - 56.8%
C+	73% - 75.8%	E	less than or below 56%

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- DOES NOT give Gordon Rule or General Education credit!

Approval of the S-U option must be obtained from your instructor. The deadline for filing an application with the Registrar and further restrictions on the S-U option are given in the UF undergraduate catalogue.

NOTE: For information about dropping and course withdrawals go to <https://catalog.ufl.edu/ugrad/current/regulations/info/drops.aspx#drop>
A complete explanation of current grade policies is found at <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

NOTE: We will not review disputed points at the end of the semester. All grade concerns must be settled within one week of the return of the paper. You must retain all returned papers in case of any discrepancy with your course grade. We cannot correct mistakes in grading or recording of scores without the original document.

14. Graded Assignments

14.1 Online Homework

The online homework administered in MyMathLab is planned to reinforce learning and to provide practice of course material. Each homework assignment is worth 2 points, and your two lowest homework assignments will be dropped. **There are no makeups for online homework. Do not try to complete an assignment in one sitting; start early instead of waiting until the due date to avoid missing the deadline.** There is a prerequisite of 80% to be able to access online quizzes.

You will need a scientific calculator for homework. Some problems may also suggest the use of a graphing calculator to help you visualize important concepts and to reinforce the mathematical processes involved. The use of a calculator is recommended but not required. Remember you will not be allowed a graphing calculator on exams.

An important part of each assignment is reading and understanding the concepts of the lecture and text material. The reading assignment for each lecture should be completed before the lecture. After class, you should review this material along with your lecture notes before you begin working problems. Calculus material is cumulative, so you should complete each assignment as thoroughly as possible before your next class.

If you are having difficulty with any assignment, you may seek help from your lecturer or course TA during scheduled office hours as well as the tutors at the Broward Teaching Center. Be sure to start problems early so you have time to get your questions answered! The multimedia section of MyMathLab also provides valuable resources, including a solutions manual for the odd problems in the textbook.

14.2 Discussion Group Work

Your discussion leader will administer group work during discussion. Each will be graded out of 10 points worth 10% of your grace. The group work will be based on recent lecture material or homework assignments from the previous week. **Since we drop the lowest group work, missed group works cannot be made up*.**

14.3 Lecture Participation

Attendance in lecture and completing problems in class (without advance notice). Points will be collected through the use of the TopHat. **YOU MAY NOT TURN IN WORK FOR A STUDENT WHO IS NOT IN CLASS.** There will be extra points available to account for an occasional absence or technical difficulties with your clicker.

14.4 Exam and Exam Policies

- MAC 2233 requires that students take evening exams on the listed dates. There are no exceptions to this. Students with conflicts, including regularly scheduled classes, must make advance arrangements to be present at the test. Because exams are online this semester I will allow a time window for exams. It is your responsibility to finish the exam by the end of this window.

- **The following applies to all exams:**

(1) Students are responsible for material covered in lectures, reading assignments, and text problems. Questions will test mastery of concepts and include challenging calculation problems. **A command of related algebraic concepts is assumed** (see the Prerequisites, page 18, in this guide). Sample tests are available from the Teaching Center one week before each exam.

(2) The proctoring platform used for the exams will be Honorlock. You will be given a handout with additional information. Honorlock has a built in basic calculator. You can use a scientific calculator up to and including the TI - 30XIIS. The TI - 36 and graphing calculators are not allowed.

(3) Your exam grade will be posted on Canvas.

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

14.5 Final Exam

The final exam is Monday **April 26th, 2021 from 5:00p.m. to 10:00p.m.** The final exam is required and is cumulative. The same exam policies apply to the final exam. The final exam is worth 20% of your course grade.

The final will also be counted as exam 4. Then only the top 3 exams scores will be considered. So the final will be in the gradebook twice, once as the final worth 20%, and then as exam 4, where it may be used to replace a lower exam score.

15. Make-up Policies

All makeup work must be approved by the course coordinator, Dr. Shabazz, during office hours. You must provide documentation of your absence.

- **Exam Time Conflicts:**

You may take a make-up exam if you are participating in a UF sponsored event during the regular exam time. You must provide documentation of the conflict to Dr. Shabazz in person at least ONE WEEK in advance of the exam date to sign up.

- **Makeup Exams:** If you are participating in a UF sponsored event or religious observance, you may make up an exam only if you make arrangements with Dr. Shabazz at least ONE WEEK PRIOR to the event. You must present documentation of a UF sponsored event.

If illness or other extenuating circumstances cause you to miss an exam, contact the course coordinator before the exam. Then, as soon as possible send the appropriate documentation to Dr. Shabazz. You will be allowed to sign up to take a makeup exam as scheduled during the semester.

- **Makeup Online Homework:** With the extended availability of online homework, we do not provide makeups for online work. Exception: if you must miss class for an extended period of time due to illness or a family emergency, see Dr. Shabazz to discuss an extension of the due date for online assignments.

- **Makeup Quizzes** Since two quizzes are dropped, no make-ups are given for online quizzes. There is a prerequisite for each quiz. You are required to achieve an 85% on the weeks homework to unlock the weeks quiz. Exception: if you must miss class for an extended period of time due to illness or a family emergency, see Dr. Shabazz to discuss other options.

- **Makeup Class Participation Points:** There are no makeups for class participation points. We collect extra points to allow for technical difficulties with your clicker or occasional absence from lecture.

16. Incomplete Grade

A student who has completed a major portion of the course with a passing grade but is unable to complete the final exam or other course requirements due to illness or emergency may be granted an incomplete, indicated by a grade of “I”. This allows the student to complete the course within the first six weeks of the following semester. The student must contact Dr. Shabazz before finals week to sign a departmental incomplete contract, and must provide documentation of the extenuating circumstances preventing him or her from taking the final exam. **The grade of “I” is never used to avoid an undesirable grade, and does not allow a student to redo work already graded or to retake the course.** See the official policy at <http://www.math.ufl.edu/department/incomplete-grades/>

Missing a final exam due to negligence, however, will result in a **minimum** 25%-point penalty.

17. Diversity Statement

I am committed to diversity and inclusion of all students in this course. I acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements

It is my 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.

18. Prerequisite concepts

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 provide a more complete review of these essential topics.

ALGEBRA

1. Basic Geometric Formulas: (b = base, l = length, h = height, w = width)

Triangle: area = $\frac{1}{2}bh$

Circle: area = πr^2 ; circumference = $2\pi r$

Parallelogram: area = bh

Rectangular box: volume = lwh

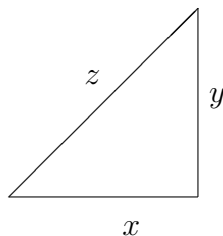
Sphere: volume = $\frac{4}{3}\pi r^3$; surface area = $4\pi r^2$

Right circular cylinder: volume = πr^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: for the right triangle below, $x^2 + y^2 = z^2$



2. Basic Functions and their graphs:

$$f(x) = x; f(x) = x^2; f(x) = x^3; f(x) = |x|; f(x) = \sqrt{x}; f(x) = 1/x;$$

$$f(x) = b^x, b > 0 \text{ and } b \neq 1, \text{ such as } f(x) = 2^x$$

3. Factoring:

$$x^3 + y^3 = (x + y)(x^2 - xy + y^2); x^3 - y^3 = (x - y)(x^2 + xy + y^2); \text{ etc.}$$

4. Fractions: $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$, etc.

5. Exponents: For appropriate values of x , m and n ,

$$x^n y^n = (xy)^n; x^n x^m = x^{n+m}; \frac{x^n}{x^m} = x^{n-m}; (x^n)^m = x^{nm}$$

6. Roots, including rationalizing the denominator or numerator (for appropriate values of x , m and n).

$$\sqrt[n]{x} = x^{\frac{1}{n}}; x^{-n} = \frac{1}{x^n}, \text{ etc.}$$

7. Inequalities and absolute values:

$$|x| \leq a \quad -a \leq x \leq a; \quad |x| > a \quad x > a \text{ or } x < -a$$

8. Equation solving: Finding solutions for x if

$$ax + b = 0; ax^2 + bx + c = 0; \text{ etc.}$$

9. Logarithms: If $x > 0$, $\log_a x = y$ if and only if $x = a^y$

If $m > 0$, $n > 0$, and c is constant, then

$$\log(nm) = \log(n) + \log(m) \quad \log\left(\frac{n}{m}\right) = \log(n) - \log(m)$$

$$\log(n^c) = c \log(n)$$