MAC 1147: Precalculus Algebra & Trigonometry SYLLABUS

FLEXIBLE LEARNING (updated 05/11/2020)

Information is constantly changing. If you find anything in this syllabus or course that appears erroneous or out-of-date (including any broken links), kindly notify the instructor listed below so that he may remedy the situation.

The course home page is located in Canvas. Log in at https://ufl.instructure.com/.

You can send a message to your instructor listed below by going to your inbox in Canvas, selecting "Compose a new message", and choosing your instructor's name as the recipient.

Note: If you are sending a message requesting assistance on a certain problem, please include details showing your work on the problem; feel free to attach a photo of your work.

Instructor

Keith Grizzell

Email: grizzell@ufl.edu (please use Canvas if possible)

Web site: https://people.clas.ufl.edu/grizzell/

Video Presenters

Lectures: Sherry Tornwall (retired)

Checkpoint Solutions: Keith Grizzell

1. University Honesty Policy

UF students are bound by The Honor Pledge which states,

> We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor 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."

The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with your instructor.

Table of Contents

2. Course Content and Policies

2a. Introduction

College algebra, functions, coordinate geometry, exponential and logarithmic functions, and trigonometry. This **fast-paced course** is designed as a review of algebra and trigonometry to prepare the student for calculus.

A minimum grade of C (not C−) in MAC 1147 satisfies four hours of both the pure math general education requirement and the Florida state math requirement. Note: A student can receive at most four credits for taking both MAC 1147, and MAC 1140 or MAC 1114, and at most five credit hours for taking MAC 1147, MAC 1140, and MAC 1114. Students who successfully complete this course (C or better) can advance directly to MAC 2311, Calculus 1 (for engineers and scientists), or into MAC 2233, Survey of Calculus.

If your goal is to take MAC 2233, Survey of Calculus (for business majors), then you might want to talk to your advisor about taking MAC 1140, Precalculus Algebra, instead of this course (which includes trigonometry) since there is no trigonometry prerequisite for MAC 2233.

Students taking this course to meet general education or Florida state requirements, who do not need precalculus for their major or as preparation for calculus, might consider taking MGF 1106, MGF 1107, or MAC 1105. For more information on math courses and math advisors go to https://math.ufl.edu/.

2b. Prerequisites

This course assumes prior knowledge of intermediate algebra (Algebra 2) and trigonometry. Students should be able to do arithmetic without a calculator.

MAC 1147 begins with a short review of high school algebra topics (appendices A1 – A7). **You should already be competent in working this material.**

2c. Required Materials

For this course you will need **two different calculators**.

- The first is **a scientific calculator**, for use on everything except the exams. Any reasonable scientific calculator should suffice. You can even use your computer's.

- The second calculator you need, is what's known as a standard function calculator. You will need to have **a hand-held standard function calculator** to use on the exams, where scientific calculators are prohibited. This type of calculator only has the ability to add, subtract, multiply, divide, take square roots, and perhaps buttons for percentages and storing values in memory. It should be very similar to the Casio HS-8VA or the Texas Instruments TI-503SV. (You can even buy one of those for a few dollars.)

  On exams, you cannot use your computer's or any scientific or graphing calculator; only a hand-held standard function calculator is allowed.

A valid **WebAssign access code** is the only other requirement since it includes access to the electronic version of the textbook. Any one of the following options should work.

- ISBN: 9781337806398 at the UF Bookstore or through UF All Access
- ISBN: 9781337879613 from the publisher, Cengage Learning (or elsewhere)
- ISBN: 9781337652575 for a printed card with an access code

You are, of course, free to choose your own vendor for purchasing an access code. You will need to make sure the access code is still valid (and unused), and that it works with our textbook. Be sure to check out the advice from Cengage/WebAssign, "Purchase an Access Code". In particular, you will need to make sure that the access code has a valid prefix. You can check what prefixes are valid by going here and searching for "Precalculus 10e" by "Larson" and published by "Cengage Learning".

Note: You might be able to sign up for a **free trial period** (from the publisher, Cengage Learning) which will allow you to access WebAssign immediately without purchasing an access code. After the trial period expires, you will be required to purchase a subscription or an access code in order to continue using WebAssign.

2d. Optional Materials

You may wish to purchase a physical copy of the textbook: *Precalculus*, 10th edition, by Larson (Cengage Learning, 2017). Here are two options.

- Hardcover ISBN: 9781337271073
- Loose leaf ISBN: 9781337806428 at the UF Bookstore

You are not required to purchase a physical copy. WebAssign access includes the electronic version of the textbook.

2e. Canvas

The main course hub is in Canvas, located at https://ufl.instructure.com/. (Use your Gatorlink username and password to login.) In Canvas, you will find the course modules and lectures, grades (after they're copied over from WebAssign), announcements, etc. Your first graded assignment, the Welcome Quiz, is also in Canvas, and must be completed with a score of 100% in order to continue with the course. (You can re-take it as often as necessary.) All other assignments will be submitted in WebAssign.

Note: Important information may be included in the announcements in Canvas. You are expected to read them periodically.

2f. WebAssign

Note: WebAssign and Canvas are separate systems, so there will be a delay before your scores in WebAssign are copied over to Canvas.

Your instructor will be enrolling you in the WebAssign section for the course by using your UF email address. Once that has occurred, you will receive a welcome message in Canvas from your instructor, which will indicate that you can then log into WebAssign. If you have been enrolled for 24 hours and have not yet received a welcome message, please contact your instructor. (That should not happen.)

The first time you log in to WebAssign, you must use the portal site

https://www.webassign.net/ufl/login.html

and click on the big red log in button: **LOG IN @ UNIVERSITY OF FLORIDA**. This will allow you to link your enrollment in this course's WebAssign section to your Cengage account, which you will be prompted to create if you do not have one. After the accounts are linked, if you wish to use your Cengage account to log in, that should be fine and you do not need to use that special button again unless you wish to do so.

In WebAssign, you will find all graded assignments (Checkpoint, Homework, Quiz, Checkup, and Exam) except the Welcome Quiz (in Canvas). Assignments will have prerequisites that must be met before starting them, and some may require passwords to unlock them. Be sure to check the description of each assignment type in the "Grading" section of this syllabus for more info.

2g. Attendance and Due Dates

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/.

There are no set dates where you are required to attend specific events in this course. You are free to choose your own dates for working this course, subject to the course time limit of 16 weeks from the date of enrollment.

2h. Course Expiration

Your course will expire at the earlier of (a) your completion of the Final Exam, or (b) the expiration of your course time limit, which is set to 11:59PM (Gainesville, FL time) on the date that is exactly **16 weeks after your enrollment date**. In either case, your grade at that point will be submitted for processing after your work first receives a final review from your instructor. In no event shall any work completed after your course expires be allowed for credit without your first requesting and obtaining approval for an extension.

2i. Extension Requests

Pursuant to Flexible Learning and University of Florida policies, your instructor is not required to allow any extensions. However, your instructor will generally approve (subject to review) those extension requests that meet the following two requirements.

- ◆ Requirement 1: You must have extenuating circumstances.

- ◆ Requirement 2: You must have completed all work in the course up through (and including) Exam 2 and with a C (70.00%) weighted average or better.

If you are requesting an extension, you must send a formal extension request, by Canvas message to your instructor, prior to your course expiration. In this request, you need to detail how Requirement 1 is met, and you need to give a proposed timeline for completing the course. If your extension request is approved, your instructor will submit an "I" (Incomplete) grade that will go on your record and your new course grade will be submitted by the end of your approved extension period (which would act as your new course time limit).

2j. Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs as early as possible.

2k. Success

Success in MAC 1147 depends largely on your attitude and effort. You need to spend time reviewing the concepts of each module **before** you attempt the homework problems. It is also important to spend some time looking over the textbook sections to be covered in the next lecture to become familiar with the vocabulary and main ideas beforehand so that you will be better able to grasp the material presented in the videos. **You should expect to spend at least 12 hours per week working on this course. Many students may need to spend more time than this to be successful in this course.**

Most students find it beneficial to work daily on the material as opposed to saving it all for one day. Also, 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 the lecturer. Students who actively participate have greater success.

If you do not complete the textbook homework (not graded) in addition to all other assignments, or if you do not complete all assignments thoroughly, then you are likely not as well-prepared as you could be for the exams. This is especially true for the material covered on Exam 3, where everyone could benefit from extra, more varied, practice. Also, if you find that you need even more practice beyond the existing assignments, you can use the unassigned problems in the textbook, in which case please also feel free to ask your instructor questions about any of those problems.

2l. Getting Help

Learning Aids

- ◆ *Your instructor* is glad to be of help. If you're seeking help on a specific problem, you should first have attempted the problem yourself. You can take a snapshot of your work and attach that to a message in Canvas requesting help.

- ◆ *The textbook's web site* (http://www.larsonprecalculus.com/precalc10e/) has a lot of good material to draw upon, including pre- and post-tests, an alternative set of lecture videos,

interactive activities, and worked out solution videos for the textbook checkpoint exercises.

♦ *The Teaching Center* (https://teachingcenter.ufl.edu/) has free tutoring.
Note: Any exam prep. or other materials geared toward other versions of this course should not be considered indicative of what the exams in this course are like. This applies equally to all third-party note or review services.

♦ The Mathematics Department maintains a list of qualified private tutors for hire. Go to https://math.ufl.edu/ and click: "Academics", then "Mathematics Tutors".

Technical Support

♦ *UF Help Desk*: http://helpdesk.ufl.edu/, helpdesk@ufl.edu, or (352) 392-HELP

♦ *WebAssign / Cengage*: https://support.cengage.com/ or (800) 354-9706

♦ *ProctorU*: https://support.proctoru.com/ or (855) 772-8678

Health and Wellness

♦ *U Matter, We Care*: If you or someone you know is in distress, please contact umatter@ufl.edu, (352) 392-1575, or visit https://umatter.ufl.edu/ to refer or report a concern and a team member will reach out to the student in distress.

♦ *Counseling and Wellness Center*: Visit https://counseling.ufl.edu/ or call (352) 392-1575 for information on crisis services as well as non-crisis services.

♦ *Student Health Care Center*: Call (352) 392-1161 for 24/7 information to help you find the care you need, or visit https://shcc.ufl.edu/.

♦ *University Police Department*: Visit https://police.ufl.edu/ or call (352) 392-1111 (or 9-1-1 for emergencies).

♦ *Other crisis hotlines*:
  o Online crisis chat: https://imalive.org/online/
  o National Suicide Prevention Lifeline: 1-800-273-TALK

Complaints

♦ Each online distance learning program has a process for student complaints within its academic and administrative departments at the program level. Go to http://www.distance.ufl.edu/student-complaint-process for more information.

3. Flexible Learning Policies

Please see https://flexible.dce.ufl.edu/faqs/ and https://flexible.dce.ufl.edu/policies/ for answers to some frequently asked questions and info about Flexible Learning policies. **It is expected that every Flexible Learning student has read through those documents.**

3a. Contact Info

♦ Email: learn@dce.ufl.edu

♦ Phone: (352) 294-6300

♦ Web site: https://flexible.dce.ufl.edu/

3b. Transcripts

Of particular importance, regarding transcripts, from the F.A.Q.:

> "The UF Registrar is notified electronically of the final course grade. Allow 5–7 business days for the UF Registrar to post final course grades to a UF transcript."

This timeframe is in addition to the time it takes for your instructor to certify your grade and submit it for processing (which might take up to 48 hours). Please plan accordingly; **your instructor is unable to certify grades in any other way**.

4. Grading

UF assures the confidentiality of educational records. This is done in accordance with the State University System's rules and state statutes, as well as The 1974 Family Educational Rights and Privacy Act (FERPA).

Any communication regarding educational records must be conducted via secure channels, e.g. through Canvas messaging (preferred) or official UF email.

4a. Course Grade

Here are the different assignment categories, as well as their weights in your course grade computation, where to find the assignments, and the number of submission attempts per assignment (for Canvas) or per question (for WebAssign).

Category	Number	Drops	Location	Weight	Submission Attempts
Welcome Quiz	1	0	Canvas	1%	∞
Checkpoints	37	3	WebAssign	7%	1
Homework	37	0	WebAssign	7%	10
Quizzes	15	3	WebAssign	7%	3
Checkups	4	1	WebAssign	9%	3
Exams	3	0[1]	ProctorU/WebAssign	48%	2
Final Exam	1	0	ProctorU/WebAssign	22%	2
Totals	98			101%	

The course grade will be determined by your final percentage as follows:

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[1] There is a single make-up opportunity for exams; see the subsection "Make-up Exam". If you take Make-up Exam N, where N is 1, 2, or 3, then technically either your Exam N score or your Make-up Exam N score is dropped (whichever is lowest is dropped).

Grade	Percentage	Grade	Percentage
A	90.00% and above	C	70.00% to 73.99%
A−	87.00% to 89.99%	C−	67.00% to 69.99%
B+	84.00% to 86.99%	D+	64.00% to 66.99%
B	80.00% to 83.99%	D	60.00% to 63.99%
B−	77.00% to 79.99%	D−	57.00% to 59.99%
C+	74.00% to 76.99%	E	56.99% and below

For S/U grades, C or greater is an S (Satisfactory) and C− or less is a U (Unsatisfactory).

For information on current UF grading policies for assigning grade points, please visit https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/.

4b. Welcome Quiz

The Welcome Quiz is to make sure you understand what is expected of you in this course. You should read through this syllabus before attempting it. It is the first assignment and **you must score 100% on the Welcome Quiz before continuing with the course.**

4c. Checkpoints

After the textbook, the lecture videos provide the main presentation of the course material. Lecture outlines can be downloaded from Canvas and can be used to take notes while viewing the videos. Each module's lecture consists of several videos with a total time of approximately 1 hour.

In each lecture video there is a Checkpoint problem that pertains to the concept recently covered. You should work the Checkpoint problem and write your answer down (a, b, c, d, or e). Once you have completed all of the lecture videos and checkpoint problems in a module, you will need to enter your answers in the corresponding Checkpoint assignment in WebAssign. You can only make one submission for each Checkpoint assignment, so you must submit all of your checkpoint answers at once. After submitting, the solution shown will contain a link to a video with the checkpoint problems worked out.

Note: Checkpoint 01 is the only checkpoint with a password, which can be found in Module 01 in Canvas.

4d. Homework

There are two classes of homework problems: ungraded and graded. The ungraded homework is a collection of problems from the textbook, as listed in each module and at the end of this syllabus. The graded homework consists of a series of Homework assignments in WebAssign, one for each lecture module. You are required to score at least 70% on each assignment to continue working in the course, but you are expected to attain 100% on every homework assignment.

You are allowed to seek limited outside assistance with the WebAssign homework, but you need to be able to work problems on your own to succeed. "Limited outside assistance" means you can ask someone for a hint or to look over your work to spot any mistakes; it does not mean you can have someone else work a problem for you in its entirety. Also, keep in mind that sometimes the best learning comes from the struggle you face in figuring out how to work a problem; that can be good mental exercise, training you to think more logically and methodically.

4e. Quizzes

The password for unlocking each quiz is "quizme" (without the quotes). You will have three attempts per question and one hour for each Quiz in WebAssign. While the quizzes are effectively open-note and open-book by virtue of not being proctored, you should prepare for them as if they are closed-note and closed-book to better reinforce your learning as you progress through the course. **You are required to work each quiz by yourself, with no assistance whatsoever from anyone else.**

4f. Checkups

The checkups are designed to give you some feedback on your understanding of the course material prior to the corresponding exam. Because of this, your first attempt to answer each question should be a thoughtful one, on your own, without referring to the textbook, notes, or anyone else. **You are required to work the checkups on your own**, but you may ask your instructor for assistance. If you have any trouble answering a question correctly under those conditions, then that indicates your need to review, study, or work more practice problems from the textbook. However, the checkups cannot cover every possibility that could appear on an exam, so they should not form the sole basis of your studying for an exam. Also, while the Final Checkup is approximately three times as long as the other checkups, it is worth exactly the same as the other checkups, but the lowest checkup score is dropped.

4g. Exams

All exams are in WebAssign but are proctored through ProctorU. To sign up for a proctoring appointment, you will need to use the invitation link provided in the corresponding Exam module in Canvas. During your appointment, your proctor will go through the exam rules with you (as a reminder, but the exam rules in this syllabus apply no matter what), and they will unlock the exam and monitor you and your desktop while you take the exam.

You may be tested on anything covered in the readings, lectures, homework (both graded and ungraded), etc. Note that questions on the exams will mostly resemble homework problems, but some may also be different (while still covering the same material). Also, **completing the checkup is not, in and of itself, sufficient preparation for an exam.**

Exams 1, 2, and 3 have a 90-minute time limit, and the final exam has a 2-hour time limit. There will be no partial credit unless a question has multiple parts that can be graded separately, in which case each part will be worth a fraction of the question's point-value. For exams, you will only have two attempts per question or part of a question, and your last submitted answer is the one that counts.

4h. Make-up Exam

You have the option to take one make-up exam for any reason, with the greater of the original exam score and the make-up exam score used in grade calculations. This make-up exam must be taken after Exam 3 and before taking the Final Exam. The make-up exam will be similar to the corresponding midterm exam in both the number of questions and the textbook sections / lecture modules being tested.

Make-up exams operate just like the other exams, and you must sign up for an appointment with ProctorU using the invitation link in Canvas. In addition, **you must let your instructor know which exam you wish to make up** by sending a message (via Canvas) at least 72 hours in advance. (Without this notification, your instructor will not unlock the exam for you to take.) Your instructor will write back to you letting you know when the exam is unlocked and ready for your appointment.

4i. Incomplete Grade

"I" (Incomplete) grades are only assigned when an extension request has been approved. See the "Extension Requests" in the "Course Content and Policies" section.

5. Sample Schedule

Week	Modules
1	Start Here, 01, 02, 03, 04
2	05, 06, 07, 08
3	09, 10, 11, 12
4	Checkup 1, Exam 1
5	13, 14, 15
6	16, 17, 18
7	19, 20, 21
8	22, 23, 24
9	Checkup 2, Exam 2
10	25, 26, 27
11	28, 29, 30
12	31, 32, 33
13	34, 35
14	36, 37
15	Checkup 3, Exam 3
16	Make-up Exam, Final Checkup, Final Exam

6. ProctorU

6a. What is ProctorU?

ProctorU is an online exam proctoring service. They will verify your identity and exam conditions, they will unlock your exam and monitor your exam administration (primarily through screen capturing and video monitoring), and they will attempt to take corrective actions if any irregularities are discovered before, during, or after the exam. They cannot, however, answer questions about the material covered on the exam or about the wording of the questions on the exam.

Be sure to check out https://www.proctoru.com/live-plus-resource-center, where (among other things) you will find all of the technical requirements and be able to test your computer to make sure it works with ProctorU.

6b. Registering with ProctorU

To register with ProctorU, you will need to visit https://www.proctoru.com/portal/ufl. Be sure to sign up using your UF email address, i.e. your UF email address that ends with "@ufl.edu". If you already have a ProctorU account associated with another school/entity, you will still need to have an account associated with UF in order to be able to schedule exams for UF courses.

6c. Scheduling Exams

For this course, the only way to schedule exams is by using a special exam invitation link that is unique to each exam. Each exam's invitation link can be found on that exam's wiki page, and all of the exam wiki pages are linked to from the course home page in Canvas. Furthermore, you can schedule exam sessions well in advance; all of the exam wiki pages are unlocked once you complete the first module.

6d. Your Testing Environment

You are responsible for ensuring an appropriate testing environment. In particular:

♦ Arrange to have a room with walls all around, a desk or table, doors closed, and no one else present. You should be facing a wall (not a window nor a door) when you take your exam. If the room is not suitable, you may not be allowed to continue with the exam.

♦ Make sure you won't be disturbed by others. Any disturbance may be reported by ProctorU as cheating.

♦ Your testing area should be cleared of everything except:

    o your computer,

    o your UF ID card, passport, or state ID,

    o a hand-held standard function calculator (see Required Materials),

    o writing instruments,

    o up to 5 sheets of completely blank scratch paper.

Any unpermitted resources present during the exam will cause you to forfeit your entire exam score and receive a 0, among other possible sanctions. It does not matter if you use them or not.

6e. Prior to Your Exam Appointment

In order to help avoid technical issues, ProctorU recommends that you use a hard-wired connection instead of Wi-Fi, if possible. You are *very strongly encouraged* to test your computer and connection prior to each exam using the following URL.

https://go.proctoru.com/students/system-metrics/new

6f. During Your Exam Appointment

- You are expected to be alone, in a quiet environment with no distractions, for the duration of your exam.

- Consider taking a bathroom break before the exam begins. Breaks during the exam are not allowed.

- Do not disconnect until after the exam when the proctor tells you it is okay to do so.

- Try to avoid looking anywhere other than at your computer, calculator, or scratch paper. Looking in other directions could be reported by the proctors as cheating.

- Do not browse to other web pages or open any other apps.

- The proctors do not have the authority to modify any rules, so don't bother asking them. Attempting to have any of the exam rules changed or waived will be considered cheating.

- In addition to your ID (when ProctorU is verifying your identity), before starting your exam you are required to clearly show the following to the camera:
    o your calculator and its face,
    o your scratch paper (both sides), and
    o your writing instruments.

6g. To Learn More...

You can visit the following sites to learn more about ProctorU.

- https://www.proctoru.com/live-plus-resource-center
- https://www.proctoru.com/portal/ufl

7. Working with Calculators

7a. Allowed Calculators

The only calculator allowed on exams is a hand-help standard function calculator, like the Casio HS-8VA or the Texas Instruments TI-503SV. For all other assignments, you are free to (and might need to) use a scientific calculator of your choosing.

7b. Exact vs. Approximate Answers

What is $\frac{1}{3}$? It is a rational number, that, when multiplied by 3, equals 1. It can also be represented by $0.\overline{3}$, where the bar over the 3 means that digit never stops repeating.

So, what happens when you use a calculator and calculate $1 \div 3$? It spits back something like 0.3333333. So, is that equal to $\frac{1}{3}$? The answer is… No, it's not, because if you clear the calculator memory, then compute 0.3333333×3, you get 0.9999999, which is *not quite* 1.

Unless a problem specifically asks for an approximation, you should assume it requires the exact answer.

7c. Working with Approximations

Since calculators may round answers, we need to be wary of that rounding error. Imagine you want to multiply (by hand) $(5 \times 7) \times 6$, and you want your answer rounded to the nearest ten. So, your calculations will involve both multiplying and rounding. Perhaps you round first and end up with $(5 \times 7) \times 6 \approx (10 \times 10) \times 10 = 100 \times 10 = 1000$. Or perhaps you wait and round after the first multiplication and get $(5 \times 7) \times 6 = 35 \times 6 \approx 40 \times 6 = 240$. To be sure, the second result is a better approximation that the first, but even that is too far off. In this problem, $(5 \times 7) \times 6 = 35 \times 6 = 210 \approx 210$ would be the correct answer. Notice that the difference isn't in the types of operations being performed, but in the fact that we wait until the very end to do the rounding (which in this case wasn't really needed).

You should keep all digits of the intermediate steps in your calculations, and only round the final answer as required by the problem.

Failure to follow this advice may lead to compounding rounding errors that make your answer wrong. Perhaps the most unobvious (and most commonly seen) version of this is if you use 3.14 for π. Well, that's only three significant digits, and many problems will require more accuracy than that. What should you do instead? First, you should keep the answer in terms of π as long as reasonably possible (to delay the rounding, thereby reducing compounded rounding errors). Second, you should use as many digits of π as will fit in your calculator (thereby making your approximation of π more accurate).

7d. Relying Too Much on Scientific Calculators

You should practice with your standard function calculator for nearly all calculations that you don't do by hand on checkpoints, homework, quizzes, and checkups, since that will be better practice for exams. Some problems on those assignments may necessitate computing an exponential, logarithmic, or trigonometric function value. Sometimes, the value you need can be obtained without resorting to a scientific calculator. For example, you do not need to use a scientific calculator to compute $\sin 60°$ or $\log \sqrt{10}$ since you should already be able to compute their exact values as $\sqrt{3}/2$ and $1/2$, respectively, simply by using properties that you should be learning along with special function values you should be memorizing.

Other times, the value you need will not be a value you're expected to have memorized nor will it be obtainable from such values used in conjunction with any common identities or function properties. In such cases, you will have little choice but to use a scientific calculator to complete

the problem using approximations. For example, you would need to use a scientific calculator to approximate $\sin 79°$ or $\log 73$.

How can you tell the difference between when a scientific calculator is really needed and when it isn't? Unfortunately, that question doesn't have a simple, clear-cut answer. For trigonometric function values, any angle that is a multiple of $15°$ will turn out to be not too bad to compute exactly because it should either already be memorized or it can be computed in terms of the values that should be memorized. For logarithms, any obvious power of the base should easy to tackle due to the inverse nature of logarithmic and exponential functions. But in general, it is up to you to get a good feel for the dividing line between what can be knowable exactly and what can only be knowable approximately, and the way to do that is with careful studying.

When you study the material in this course, or any other course for that matter, you should always be questioning the limits of the knowledge you're assimilating. For example, if you learn a new trigonometric identity, you need to ask yourself how it could be used to exactly calculate new trigonometric function values using the ones you already know, thereby enlarging the range of trigonometric function values you could compute by hand (and get an exact value). That is how you get to know the dividing line between for what you need a scientific calculator and for what you don't, between for what you can only approximate and for what an exact answer is possible.

7e. How to Work Exam Problems Without a Scientific Calculator

If a problem on any exam would normally <u>require</u> the use of a scientific calculator (because it is unfeasible to compute it exactly), then you will be given additional information in the exam to aid in computing the approximation, either directly giving certain function values that you may need or giving you function values that can be used to determine the value you need. For example, if the approximate value of $\ln 6$ was needed, then an exam problem include a statement of that value (possibly among others), or the exam problem might include approximations for $\ln 2$ and $\ln 3$ from which you can compute an approximation for $\ln 6$ (since $\ln 6 = \ln 2 + \ln 3$). Please note, though, that because of their ubiquity, at the top of every exam you will be supplied with the approximate values for π and e. So, if you needed, for example, to compute π^{-3}, then you could just use the approximation for π from the top of the exam, multiply three copies of that approximation together, then take the reciprocal to get the answer, i.e. calculate $1/(\pi \times \pi \times \pi)$.

As you can see from the preceding discussion, all of the types of problems you see in homework can appear on exams even if you have to use a scientific calculator for the homework.

8. Textbook Homework Assignments

You should read the textbook sections covered in each module before viewing the videos. After each set of lecture videos, review your notes and the textbook to make sure you understand the main ideas prior to working these exercises.

You should complete each assignment before moving on to the next lecture, since the material in each lecture often builds on previous concepts.

Module 01: Real Numbers and Their Properties

Reading: Syllabus, Appendix A.1

Exercises (A.1), page A11: 1, 3, 6, 7, 9, 16, 19, 21, 25, 27, 33, 35, 37, 38, 41, 44, 47, 49, 57, 62, 69, 71, 73, 74, 75, 77

Module 02: Exponents and Radicals

Reading: Appendix A.2

Exercises (A.2), page A23: 1, 4, 8, 10, 13, 20, 25, 26, 29, 30, 39, 41, 46, 47, 49, 51, 52, 53, 55, 57, 58, 59, 60, 61, 63, 65, 68, 71, 72, 73, 74

Additional exercise: Simplify the radical expression $\sqrt[3]{81x^7y^2} \cdot \sqrt[3]{36x^2y^2}$.

Module 03: Polynomials and Factoring

Reading: Appendix A.3

Exercises (A.3), page A33: 1, 2, 5, 8, 11, 17, 23, 25, 29, 31, 33, 35, 39, 41, 43, 45, 49, 53, 57, 65, 69, 75, 81, 88, 91, 92

Module 04: Rational Expressions

Reading: Appendix A.4

Exercises (A.4), page A42: 4, 5, 7, 15, 19, 29, 31, 35, 38, 42, 45, 50, 53, 54, 55, 58, 59, 60, 61, 67, 70, 72, 73, 77, 79, 80

Module 05: Solving Equations

Reading: Appendix A.5

Exercises (A.5), page A56: 1, 3, 4, 12, 17, 19, 21, 24, 33, 37, 41, 42, 43, 50, 51, 54, 62, 64, 70, 75, 78, 79, 82, 84, 85, 87, 88, 90, 91, 94, 96, 98, 99, 100

Additional exercises: Find all real solutions and check your answers.

1. $6x^{-2} + x^{-1} = 2$

2. $8(m-4)^4 - 10(m-4)^2 + 3 = 0$

3. $(y+3)^{2/3} - 2(y+3)^{1/3} - 3 = 0$

4. $4(x+1)^{1/2} - 5(x+1)^{3/2} + (x+1)^{5/2} = 0$

5. $\dfrac{1}{x-3} + \dfrac{3}{x+3} = \dfrac{6x}{x^2-9}$

6. $\dfrac{x^2-9}{x^2-2x-3} = \dfrac{3}{2}$

7. $x^8 - 4x^4 - 5 = 0$

8. $3x^4 + 10x^2 - 25 = 0$

9. $\sqrt{x+7} + 3 = \sqrt{x-4}$

10. $2x = 1 - \sqrt{2-x}$

11. $x = \sqrt{15 - 2x}$

12. $(5x^2 - 6)^{1/4} = x$

13. $\sqrt[3]{4x + 3} = \sqrt[3]{2x - 1}$

14. $(2x - 1)^{2/3} = x^{1/3}$

15. $\sqrt{x} - (3)\sqrt[4]{x} - 4 = 0$

16. $x^{1/2} + 3x^{-1/2} = 10x^{-3/2}$

17. Factor $x^6 - 2x^4 + x^2$ completely and find all of the real solutions of the equation $x^6 - 2x^4 + x^2 = 0$.

Module 06: Linear Inequalities, Algebraic Errors

Reading: Appendices A.6 and A.7

Exercises (A.6), page A64: 4, 5, 15, 28, 34, 38, 54, 55, 69, 73, 75, 76, 79, 80, 81, 83, 86, 89, 91, 93, 95, 97, 101, 105, 109, 110, 111, 112, 114

Exercises (A.7), page A72: 3, 7, 10, 15, 19, 21, 23, 25, 28, 29, 33, 37, 39, 43, 51, 53, 55, 56, 57

Module 07: Rectangular Coordinates, Graphs of Equations

Reading: Sections 1.1 and 1.2

Exercises (1.1), page 8: 1, 2, 3, 4, 9, 11, 13, 26, 28, 29, 38, 40, 43, 47, 48, 51, 52, 53, 54, 58

Exercises (1.2), page 19: 2, 4, 5, 11, 15, 21, 28, 29, 31, 33, 37, 40, 41, 42, 43, 45, 47, 67, 69, 72, 73, 78, 80, 83 a, b, 87, 88, 89

Additional exercises:

1. Find the equation of a circle in standard form with center at the point $(-3, 2)$ and tangent to the line (touching the line) $y = 4$.

2. Given the circle $x^2 + (y + 1)^2 - 1 = 8$, find its center, radius, and intercepts. (Hint: Sketch the graph.)

Module 08: Linear Equations in Two Variables, Functions

Reading: Sections 1.3 and 1.4

Exercises (1.3), page 31: 2, 4, 5, 9, 11, 13, 21, 23, 27, 39, 41, 47, 55, 65, 67, 68, 69, 70, 71, 73, 87, 89, 91, 93, 94, 95, 99, 101, 103, 104, 105, 107, 110, 111

Exercises (1.4), page 44: 1, 3, 4, 5, 7, 11, 13, 17, 18, 22, 23, 27, 33, 41, 42, 44, 46, 53, 56, 57 a, c, 59, 61, 63, 64, 67, 75, 78, 81, 85, 86, 89, 90, 92

Module 09: Analyzing Graphs of Functions

Reading: Section 1.5

Exercises (1.5), page 56: 1, 2, 6, 7, 9, 11, 13, 19, 24, 36, 40, 55, 63, 66, 67 a, c, d, e, 71, 73, 74, 75, 76, 83, 85, 91, 92, 93, 94, 95, 96, 99

Module 10: A Library of Parent Functions, Transformations of Functions

Reading: Sections 1.6 and 1.7

Exercises (1.6), page 65: 2, 3, 4, 5, 6, 7, 8, 9, 12, 35, 43, 48, 49, 50

Exercises (1.7), page 72: 1, 2, 3, 4, 5, 8, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 34, 36, 37, 40, 43, 45, 47, 49, 50, 63, 64, 65, 66, 67, 68, 69, 70

Module 11: Combinations of Functions: Composite Functions

Reading: Section 1.8

Exercises (1.8), page 81: 1, 2, 3, 5, 10, 11, 13, 17, 23, 31, 33, 35, 38, 42, 43, 45, 47, 49, 61, 62, 63, 65, 67, 69, 72, 73 a

Module 12: Inverse Functions

Reading: Section 1.9

Exercises (1.9), page 90: 1, 2, 3, 4, 5, 6, 15, 19, 23, 25, 29, 31, 33, 35, 37, 39, 45, 47, 48, 51, 55, 61, 62, 63, 66, 68, 73, 77, 80, 83, 89, 91, 92, 93, 97, 100

Module 13: Quadratic Functions and Models

Reading: Section 2.1

Exercises (2.1), page 120: 1, 3, 5, 6, 7, 8, 12, 14, 16, 26, 35, 39, 47, 52 no calc, 53 no calc, 57, 63, 66, 67, 69, 71, 73, 75, 76, 77

Module 14: Polynomial Functions of Higher Degree, Polynomial and Synthetic Division

Reading: Sections 2.2 and 2.3

Exercises (2.2), page 132: 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 17, 19, 21, 23, 24, 25, 53, 61, 65, 69, 73, 74, 75, 78, 93 a, b, 99, 100, 101, 103, 105, 106, 107

Exercises (2.3), page 142: 4, 5, 6, 7, 19, 33, 42, 45, 51 a, b, 62, 67, 80, 83, 86, 87, 89, 93

Module 15: Complex Numbers

Reading: Section 2.4

Exercises (2.4), page 150: 1, 2, 3, 4, 5, 6, 9, 11, 15, 16, 19, 21, 25, 27, 33, 35, 37, 41, 43, 45, 52, 54, 55, 57, 58, 59, 61, 63, 65, 66, 68, 77, 79, 81, 83, 85, 88 a, 89, 91, 92, 95

Module 16: Zeros of Polynomial Functions, Rational Functions

Reading: Sections 2.5 and 2.6

Exercises (2.5), page 162: 2, 3, 4, 9, 11, 14, 15, 20, 25, 30, 33, 41, 43, 48, 54, 55, 60, 61, 64, 68, 95, 98, 99, 100, 101, 102, 103 a, b, 105, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 119, 120, 121, 123

Exercises (2.6), page 175: 1, 2, 3, 10, 13, 15

Module 17: Rational Functions

Reading: Section 2.6

Exercises (2.6), page 175: 19, 21, 23, 27, 29, 31, 37, 39, 40, 41, 42, 72 a, 78, 81

Module 18: Nonlinear Inequalities

Reading: Section 2.7

Exercises (2.7), page 185: 1, 2, 7, 11, 23, 26, 28, 29, 35, 37, 39, 40, 44, 46, 52, 53 no calc, 55 no calc, 68, 70, 71, 75, 80, 86, 87 a

Module 19: Linear and Nonlinear Systems of Equations, Two-Variable Linear Systems

Reading: Sections 7.1 and 7.2

Exercises (7.1), page 475: 1, 2, 4, 5, 7, 10, 16, 19, 23, 26, 30, 31, 32, 33, 38, 41, 54, 57, 58, 63, 65, 67, 68, 69, 70

Exercises (7.2), page 486: 1, 8, 9, 12, 16, 25, 28, 30, 31, 33, 41, 42, 43, 49 a, b, 51, 61, 64

Module 20: Exponential Functions and Their Graphs

Reading: Section 3.1

Exercises (3.1): page 206: 13, 14, 15, 16, 19, 20, 21, 23, 25, 27, 29, 31, 37, 39, 41 no calc, 43 no calc, 44 no calc, 45, 47, 49, 53, 57, 59, 62 a, 63 a, 67, 68, 69, 71, 73, 78, 79

Module 21: Logarithmic Functions and Their Graphs

Reading: Section 3.2

Exercises (3.2), page 216: 1, 2, 4, 5, 7, 13, 15, 16, 17, 18, 19, 20, 25, 26, 27, 28, 29, 31, 33, 37, 38, 39, 40, 41, 43, 45, 47, 48, 49, 53, 61, 62, 63, 64, 65, 66, 67, 70, 77, 84, 85, 86, 88

Module 22: Properties of Logarithms

Reading: Section 3.3

Exercises (3.3), page 223: 2, 4, 5, 13, 15, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 53, 58, 69, 73, 75, 77, 79, 81, 91, 92, 93, 97, 101, 102, 104

Module 23: Exponential and Logarithmic Equations

Reading: Section 3.4

Exercises (3.4), page 233: 1, 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 33, 35, 36, 42, 44, 52, 55, 56, 57, 60, 72, 74, 77, 78, 79, 83, 85, 89, 90, 91, 92

Module 24: Exponential and Logarithmic Models

Reading: Section 3.5

Exercises (3.5), page 243: 1, 5, 6, 7, 12, 15, 21, 23, 25, 27, 31, 33, 35 a, b, d

Module 25: Radian and Degree Measure

Reading: Section 4.1

Exercises (4.1), page 267: 1, 2, 3, 4, 5, 6, 7, 9, 11, 14, 15, 17, 21, 23, 25, 27, 29, 33, 35, 37, 51, 53, 55, 58, 60, 63, 65, 69, 70, 71, 72, 73, 74, 75, 77, 78

Module 26: Trigonometric Functions: The Unit Circle

Reading: Section 4.2

Exercises (4.2), page 275: 2, 4, 7, 9, 10, 11, 12, 19, 21, 23, 31, 33, 35, 37, 39, 41, 49, 51, 52, 53, 54, 55, 60, 61

Module 27: Right Triangle Trigonometry, Trigonometric Functions of Any Angle

Reading: Sections 4.3 and 4.4

Exercises (4.3), page 284: 1, 2, 3, 4, 5, 13, 21, 23, 40, 45, 57, 59, 61, 63, 64, 65, 67, 68, 72, 75, 76, 77, 78, 79, 80, 81

Exercises (4.4), page 294: 1, 2, 3, 4, 5, 6, 8, 11, 16, 19, 21, 24, 27, 31, 34, 45, 49, 51, 53, 67, 72, 91, 97

Module 28: Graphs of Sine and Cosine Functions

Reading: Section 4.5

Exercises (4.5), page 304: 1, 2, 3, 4, 5, 7, 9, 13, 15, 17, 19, 21, 23, 25, 27, 29, 35, 39, 43, 49, 51, 57, 65, 69, 72, 75, 78, 79, 89, 91

Module 29: Graphs of Other Trigonometric Functions

Reading: Section 4.6

Exercises (4.6), page 315: 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 27, 29, 35, 37, 57, 58, 59, 60, 85, 87, 88

Module 30: Inverse Trigonometric Functions

Reading: Section 4.7

Exercises (4.7), page 324: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 15, 17, 19 no calc, 37, 38, 39, 41, 43, 45, 47, 49, 51, 55, 59, 63, 67, 71, 75, 76, 79, 81, 99, 105, 106, 107, 108

Module 31: Applications and Models

Reading: Section 4.8

Exercises (4.8), page 334: 1, 5, 9, 13, 17, 19, 21, 22, 24, 27, 29, 30, 32, 34, 35, 39, 40

Module 32: Using Fundamental Identities

Reading: Section 5.1

Exercises (5.1), page 353: 1, 2, 3, 4, 5, 6, 8, 13, 15, 16, 17, 18, 21, 27, 29, 35, 40, 41, 44, 50, 53, 56, 57, 61, 71, 75

Module 33: Verifying Trigonometric Identities

Reading: Section 5.2

Exercises (5.2), page 360: 1, 2, 3, 4, 5, 6, 7, 8, 12, 15, 20, 21, 22, 26, 30, 32, 36, 38, 52, 55, 56, 63, 64, 67

Module 34: Solving Trigonometric Equations

Reading: Section 5.3

Exercises (5.3), page 370: 1, 2, 3, 4, 8, 11, 18, 20, 21, 24, 26, 36, 37, 40, 43, 47, 60, 64, 65, 67, 69, 71

Module 35: Sum and Difference Formulas

Reading: Section 5.4

Exercises (5.4), page 378: 1, 2, 3, 4, 5, 6, 8, 12, 18, 24, 27, 29, 33, 35, 39, 41, 47, 51, 53, 57, 59, 65 no calc, 69, 73, 81, 82

Module 36: Multiple-Angle and Product-to-Sum Formulas

Reading: Section 5.5

Exercises (5.5), page 388: 1, 2, 4, 5, 7, 9, 11, 15, 21, 25, 27, 35, 41, 45

Module 37: Law of Sines, Law of Cosines

Reading: Sections 6.1 and 6.2

Exercises (6.1), page 406: 5, 7, 9, 11, 13, 15, 17, 24, 25, 27, 30, 33, 34, 35, 36, 38, 40, 45, 48, 49, 50, 51, 52, 53

Exercises (6.2), page 413: 5, 7, 9, 11, 13, 15, 17, 25, 26, 29, 30, 37, 40, 43, 44, 45, 46, 49, 51, 52, 55, 58, 59