

AskDrCallahan Algebra II with Trigonometry Teacher's Guide

**4th Edition
rev 081712**

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Welcome to AskDrCallahan Algebra II with Trig

Start Here!

1. Make sure you have all of the following.
 - College Algebra with Trigonometry, Seventh Edition
Textbook by McGraw-Hill. ISBN: 0072368691
 - Solution to Selected Problems (coil bound book) by
AskDrCallahan
 - Graphing calculator
 - DVD set of seven (7) DVDs
2. Both the teacher and the student should put in the first DVD and play the course introduction. Then review the syllabus. Perhaps it will make sense to add some dates to the syllabus to help you plan. The syllabus is designed like most college courses, so using the syllabus will be excellent preparation for what is to come. (The syllabi for both the Algebra II and the Trigonometry can be downloaded from the website under support/downloads.)
3. Begin the student working in chapter 1 which should be a review for most. Have them watch the video for a section then work the problems. Using the syllabus as a guide, allow the student to move at a comfortable pace making sure they understand the material.
4. If you need help, start with a visit to the website at www.askdrcallahan.com/support.
5. Feel free to copy any of the material in this workbook as needed to teach the course.

Courses by AskDrCallahan

- Algebra 1
- Geometry
- Algebra II with trigonometry
Can be used for Algebra II or Trig alone or as Precalculus
- Calculus 1 (Equivalent to Calculus 1 at most universities)
- Discovering the Entrepreneur in You

See website for more details.

Website: www.askdrcallahan.com

Email: support@askdrcallahan.com

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How to run the course

The best way to manage the course is for students to take one section of the text at a time and work through it in a logical fashion. We recommend watching one section of the DVD then working the problems in the corresponding section of the text. Go back to the DVD and text examples as needed to make sure most of the problems can be easily worked and understood.

Before moving on to the next section, make sure the current section is understood. Be aware some sections are more complex than others – so things will vary.

If questions arise that are not answered – please email us. We will provide answers or other help as needed – including emailing solutions, video solutions, or helping on the phone.

Pace

The syllabus has the projected dates we would use if we taught this material in a classroom meeting one day per week for two hours at a time. However, even in the classroom we will not always be on schedule since adjustments are always being made. You should not be overly concerned with following the schedule exactly – but use it as a guide. If you need to slow down – even significantly – to make sure the concepts are understood you are doing the right thing. For the ACT and SAT (and to move onto Calculus) an understanding of the fundamentals is more critical than the ability to cover all the material.

Suggested problem set

The syllabus lists suggested problems. Like the schedule, these problems are a suggested guide - what you might expect to see in a college or public high school course. Work more or less as needed – however avoid the temptation (or negotiations) to skip most of the problems in a section. We have carefully chosen problems that need to be understood. It is RARE that someone can just look over problems and say they know how to work them after looking at examples. Math is like music – it must be practiced to become proficient.

Also resist the temptation (some parents have) to assign ALL of the problems or all of the odd problems. While it is possible for a student to do all of the problems, the amount of time needed would be significant and likely impact other courses.

Textbook Problems -- A, B, C, Applications

Text problems are arranged by section A, B, C, and Applications. The A problems are the easiest, and almost exact repeats of the examples. Problem set B is a little more difficult.

Problem set C are often theory based – many being preludes to calculus. We have not assigned many of the C problems, but instead focused on the applications.

The application problems are often word problems, and most times are very simple. The goal is not to be challenging so much in the raw math, but to show application. Those application problems that are a little harder are marked by a star - but even these are usually straight forward.

Chapter 1&2 (algebra review)

Make sure the student is comfortable with and can accurately work the problems in chapters 1 and 2. These chapters are review for many students, while others never made it quite this far in their previous work. Either way is OK – this text has plenty of material to cover the subject. Just practice. These problems are key on SAT and ACT type exams – as well as the fundamental building blocks for the rest of the course. Take time here as needed. Do not be pushed by the outlined schedule – remember it is a guideline. Every student will be different.

Chapter 3-5 (algebra II)

These three chapters make up the meat of what we call algebra II. Chapter 3 and 4 are the most challenging of these chapters. The student should not get too caught up in all of the tools the book presents for dealing with the various functions in these chapters. The goal is to understand the basic functions. We encourage the student to use graphs and sketches as much as possible to get a visual feel for the material – we have found that to be very helpful in the understanding.

Chapter 6-8 (trigonometry)

The last three chapters make up the trigonometry section of the course. This material is really less than a semesters worth, but we have scheduled it as often seen in the high school or college courses. These chapters are mixed with simple proofs and practical applications. A student planning to take high school physics or go into any physics or engineering field needs to be well versed in trigonometry.

Syllabus Algebra II (first semester of Algebra II with Trigonometry)

Required Textbooks

College Algebra with Trigonometry, Seventh Edition, Raymond Barnett, Michael Ziegler, Karl Byleen, McGraw-Hill.

Text Website <http://www.mhhe.com/math/precalt/barnettcat7/>

Suggested Grading (first semester)

75% Three tests (~25%each)

25% Semester final exam

Suggested Schedule

Week	Student Action	Suggested Homework Problems
1-2	Review DVD of Ch. 1.1-1.7	1.1 - 1,2,3,6,7,8 9-25 odd 1.2 - 1,2,3,5,7,9,11,13,17,19,21,27,29, 35,37,68 1.3 - 1,3,5,7,8,11,13,15,25,29,37,73 1.4 - 1,3,5,7,9,13,25,29,39,41 1.5 - 1,3,5,7,9,13,17,21,23,27,31,33,43,45,46,57,71 1.6 - 1,3,7,13,17,21,23,29,31,35,43,55,71 1.7 - 1,3,5,9,11,15,17,21,29,33,45,53,59,67,79,81,95
3	Review DVD of Ch 2.1-2.3	2.1 - 1,3,5,7,9,11,13,15,17,21,23,45,53,55,57 2.2 - 1,3,5,7,11,15,23,25,31,33 2.3 - 1,3,5,7,11,15,21,25,29,31,41,43,47,68,77
4	Review DVD of Ch 2.4-2.6	2.4 - 1,3,5,9,11,17,19,21,29,35,41,45,57,91 2.5 - 1,3,5,7,9,11,13,15,17,21,25,27,31,35,43 2.6 - 1,3,5,7,9,15,19,21,25,27,29,31,33,37,41,47,79,87
5	Test Review DVD of Ch 2.7	Take Test 1 (Sections 1.1-2.3) 2.7 - 1,3,7,11,15,19,23,27,33,37,41,47,49,51,53
6	Review DVD of Ch 2.8-3.2	2.8 - 1,3,5,13,15,19,23,29,49,53,57 3.1 - 1,5,9,11,15,19,25,27,29,31,33,35,39,49,53,89,91 3.2 - 1,3,7,5,15,17,23,25,31,35,39,45,47,53,65,71,73,86
7	Review DVD of Ch 3.3-3.6	3.3 - 1,3,5,7,9,11,13,15,17,19, 21,25,31,33,43,47,65,67,91 3.4 - 1,5,9,13,17,19,23,35,77 3.5 - 1,3,5,7,9,11,15,31,39,59,89 3.6 - 1,5,7,13,15,19,33
8	Test	Take Test 2 (Section 2.4-3.3)
9	Review DVD of Ch 4.1-4.3	4.1 - 1,3,5,7,9,15,17,21,23,27,29,35,43,45,53,55,57 4.2 - 1,3,5,11,13,15,17,21,27,29,33,37,41,45,49,75,87 4.3 - 1,3,5,7,11,15,17,23,27,47,49
10	Review DVD of Ch 4.4-4.5	4.4 - 1,3,5,9,15,19,21,33,47,67,71,73 4.5 - 9,17,29 (this section can be skipped and is not covered on the videos)

11	Review DVD of sections Ch 5.1-5.2	5.1 - 5,11,13,21,23, 27 ,33, 61 ,63,65, 69 5.2 - 1-15 odd, 27 ,31,33,35,37,43,47,49,51,57,61, 63,65
12	Review DVD of Ch 5.2-5.5	5.3 - 1-31 odd,35,39,43,45,49,55,57,61, 67 ,79,81,83,87,93, 105 5.4 - 1-31 odd, 35,53, 55 ,57, 61,65 5.5 - 1-37 odd, 77, 81, 83, 85 (see notes), 87, 90
13	Test	Take Test 3 (Section 3.4-5.3)
14	Review for final exam	Study for Final
15	Final Exam	Take Final (Sections 1.1 to 5.5)

** Problems in bold are solved in the solutions manual provided on CD by AskDrCallahan.

Trigonometry (second semester of [Algebra II](#) with Trigonometry)

Required Textbooks

College Algebra with Trigonometry, Seventh Edition, Raymond Barnett, Michael Ziegler, Karl Byleen, McGraw-Hill.

Text Website <http://www.mhhe.com/math/precalt/barnettcat7/>

Grading (per semester)

70% Two tests (~35%each)

30% Semester final exam

Suggested Schedule

Week	Student Action	Suggested Homework Problems
1	Review DVD of Ch. 6:1-6:2	6:1 - 1,3,5,7,9,11,13,15, 19,35,41,43,45,47,49,53, 67 ,73,75 6:2 - 1,3,7,9,11,13,15,23, 27,31, 45 ,47, 55
2	Review DVD of Ch. 6:3 -6:4	6:3 - 7,11,13,15,25,27,31, 33,37, 55 , 59 6:4 - 1,3,5,7,11,17,31,33,35, 39,43, 61 ,83
3	Review DVD of Ch. 6:5 -6:6	6:5 -1,3,5,7,9,11,15,17,23,27,29, 31 , 33 ,37,39,43,47,49, 51 ,53,67 6:6 - 1,3,5,7,9,11, 21 ,25
4	Review DVD of Ch. 6.7-6.8	6.7 - 1,3,5,7,11,13,17,19,21,23,25,29,31,33,39, 51 ,71, 73 , 74 , 79 6.8 - 1,5,9, 11 , 31
5	Review DVD of Ch. 6.9	6.9 - 1 5,11,19,21,23,33,37,45,47,67
6	Review DVD of Ch. 7.1-7.2	7.1 - 1,3,7, 11 ,17,23,25, 37 , 43 , 47 7.2 - 1,3,5,7,11,13,21, 25 , 29 , 33
7	Test	Take Test 1 (Section 6.1-6.9)
8	Review DVD of Ch 7.3-7.4	7.3 - 1,3,5,7,9, 15 , 17 , 21 ,35, 69 , 71 7.4 - 1,3,5,9,11,15, 17 , 23 ,49
9	Review DVD of Ch 7.5-8.1	7.5 - 1,3,7,13,17,19, 21 , 25 , 31 ,35, 43 ,47, 63 , 65 , 67 , 71 8.1 - 1,5,9,11,21,27,29, 35 , 37 , 39 , 41
10	Review DVD of Ch 8:2-8.4	8.2 - 3,5,11,17,25, 27 , 33 8.3 - 1,3,7,9,13, 25 , 29 , 33 8.4 - 1,3,7,8,11,13,15,17,21,23,25,31, 45 , 47 , 49 , 51
11	Test	Take Test 2 (Sections 7.1-7.5)
12	Review DVD of Ch 8.5	8.5 - 1,3,7,11,15,17,19,21,23,25,29,39,45,47,49,53, 63 , 65 , 69
13	Review DVD of Ch 8.6-8.7	8.6 - 1,3,5,7,9,11,13,15,17,21,23,25,27, 35 8.7 - 1,3,5,7,9,15,19,31, 33 , 45
14	Review	Study for Final
15	Final Exam	Take Final (Sections 6.1 to 8.7)

** Problems in bold are solved in the solutions manual provided on CD by AskDrCallahan.

Algebra II with Trigonometry Test Grading Guide

Welcome teacher!

This test grading guide is designed to make the grading and grading of tests as easy as possible while at the same time encouraging learning by the student.

When to take the tests

The tests should be taken after the student has completed the sections covered on the tests. The syllabus indicates how we would deliver the tests in a classroom environment, but you can give the test whenever the student is ready.

How to take the tests

The tests are given straight out of the textbook, so the problems should be very similar to the homework. The answers to the test are NOT in the textbook, you have the answers and the solutions in this grading guide only. It is recommended that this test be taken open book and open notes. In addition, you might find it best to allow the student to work the test over a few days.

How to grade

You will find the sheets used to grade the test following these notes. We recommend you grade CORRECT ANSWER ONLY. We also recommend two (or more) tries for problems the student misses on the test.

Here is how we do it. (See the attached example)

First – we deliver the test, then grade for correct answer only. We give the student the grade with problems marked correct or incorrect. The initial grades may be low, but we encourage the student not worry about this yet.

Second – we allow the student to go back and attempt to correct the problems they missed. This method encourages them to learn from their mistakes. We then re-grade the problems they initially had wrong, giving partial credit for the accurate solutions.

We have included an example grading sheet showing a student who got 10 of 12 problems correct on the first try. Then on the retest they got the other two problems correct. We graded as giving them 50% of the original credit and adding it to the final grade.

The solution guide has the complete solution to the problem - but your focus on the initial grade should be with the final answer only. Note that in some chapters

(especially chapter 7 problems) the student is asked to verify the solution in the book. In this case you just need to make sure the steps the student took are similar to what is found in the solution. Sometimes the student may answer YES or NO since they are being asked to verify if the solution is true or not.

Adjustments you can make

You may want to allow the student to try a third or fourth time. This is not cheating – the goal is to learn!

You might also want to adjust the partial credit on the rework. To adjust, use another number on line e of the grade sheet. (Using 80 instead of 50 would give 80% of the points for corrected problems.)

Filing and grade management

We know that each person has different filing requirements, so if you choose to not keep the grades in this solutions book feel free to copy the grade sheets for easier filing. The grading sheets are also available on the website under support/downloads.

Test Grade Sheet

Student EXAMPLE

Course Algebra II with Trig

Test Number 1

Attempt # 1

- a. Number of problems correct 8
- b. Total number of problems 12
- c. Grade ($100 \cdot a/b$) 67 (round up to nearest integer)

Attempt #2

- d. Number of problems fixed 3
- e. Points added ($50 \cdot d/b$) 12.5

Test Grade

- f. Final Grade ($c + e$) 80 (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. **Number of problems correct** _____
- b. **Total number of problems** _____
- c. **Grade ($100 \cdot a/b$)** _____ (round up to nearest integer)

Attempt #2

- d. **Number of problems fixed** _____
- e. **Points added ($50 \cdot d/b$)** _____

Test Grade

- f. **Final Grade ($c + e$)** _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. Number of problems correct _____
- b. Total number of problems _____
- c. Grade ($100 \cdot a/b$) _____ (round up to nearest integer)

Attempt #2

- d. Number of problems fixed _____
- e. Points added ($50 \cdot d/b$) _____

Test Grade

- f. Final Grade ($c + e$) _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. **Number of problems correct** _____
- b. **Total number of problems** _____
- c. **Grade ($100 \cdot a/b$)** _____ (round up to nearest integer)

Attempt #2

- d. **Number of problems fixed** _____
- e. **Points added ($50 \cdot d/b$)** _____

Test Grade

- f. **Final Grade ($c + e$)** _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. **Number of problems correct** _____
- b. **Total number of problems** _____
- c. **Grade ($100 \cdot a/b$)** _____ (round up to nearest integer)

Attempt #2

- d. **Number of problems fixed** _____
- e. **Points added ($50 \cdot d/b$)** _____

Test Grade

- f. **Final Grade ($c + e$)** _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. **Number of problems correct** _____
- b. **Total number of problems** _____
- c. **Grade ($100 \cdot a/b$)** _____ (round up to nearest integer)

Attempt #2

- d. **Number of problems fixed** _____
- e. **Points added ($50 \cdot d/b$)** _____

Test Grade

- f. **Final Grade ($c + e$)** _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. **Number of problems correct** _____
- b. **Total number of problems** _____
- c. **Grade ($100 \cdot a/b$)** _____ (round up to nearest integer)

Attempt #2

- d. **Number of problems fixed** _____
- e. **Points added ($50 \cdot d/b$)** _____

Test Grade

- f. **Final Grade ($c + e$)** _____ (round up to nearest integer)

Test Grade Sheet

Student _____

Course _____

Test Number _____

Attempt # 1

- a. **Number of problems correct** _____
- b. **Total number of problems** _____
- c. **Grade ($100 \cdot a/b$)** _____ (round up to nearest integer)

Attempt #2

- d. **Number of problems fixed** _____
- e. **Points added ($50 \cdot d/b$)** _____

Test Grade

- f. **Final Grade ($c + e$)** _____ (round up to nearest integer)

Algebra II Test 1

- Check your answers where possible and show the work where you checked your answers.
- Circle your final answer to each problem. (include units if applicable)

From the textbook, work problems (12 total)

1.3: 12
1.4: 22
1.5: 32, 40
1.6: 18
1.7: 42, 96
2.1: 20, 46
2.2: 10, 34
2.3: 28

Algebra II Test 2

- Check your answers where possible and show the work where you checked your answers.
- Circle your final answer to each problem. (include units if applicable)

From the textbook, work problems (8 total)

2.4: 46
2.5: 30
2.6: 40
2.7: 18
2.8: 18
3.1: 56
3.2: 42
3.3: 48

Algebra II Test 3

- Check your answers where possible and show the work where you checked your answers.
- Circle your final answer to each problem. (include units if applicable)

From the textbook, work problems (9 total)

3.4: 18
3.5: 86
4.2: 42
4.3: 48
4.4: 20
5.1: 60
5.2: 12, 52
5.3: 42

Algebra II Final

- Check your answers where possible and show the work where you checked your answers.
- Circle your final answer to each problem. (include units if applicable)

From the textbook, work problems (8 total)

2.2: 32
2.6: 36
3.3: 24
4.1: 14
4.2: 42
4.4: 16
5.3: 38
5.4: 38

Trigonometry Test 1

- Check your answers where possible and show the work where you checked your answers.
- Circle your final answer to each problem. (include units if applicable)

From the textbook, work problems. (10 total)

6.1: 18, 48

6.2: 30

6.3: 46

6.4: 84 (a and b)

6.5: 48

6.7: 24, 76

6.8: 14

6.9: 36

Trigonometry Test 2

- Check your answers where possible and show the work where you checked your answers.
- Circle your final answer to each problem. (include units if applicable)

From the textbook, work problems. (10 total)

7.1: 20, 44, 64

7.2: 20, 36

7.3: 2, 16, 22

7.4: 50 (part A only)

7.5: 24

Trigonometry Final

- Check your answers where possible and show the work where you checked your answers.
- Circle your final answer to each problem. (include units if applicable)

From the textbook, work problems. (7 total)

6.4: 30

8.1: 38

8.2: 38

8.3: 26

8.4: 50

8.5: 20

8.6: 24

Algebra II - Test 1 Solutions

1.3 : 12

$$5x^2 - 40x - x + 8 = 5x(x - 8) - (x - 8) = (x - 8)(5x - 1)$$

1.4 : 22

$$\frac{4x^4(x^2 + 3) - 3x^2(x^2 + 3)^2}{x^6} = \frac{x^2(x^2 + 3)[4x^2 - 3(x^2 + 3)]}{x^6} = \frac{(x^2 + 3)(x^2 - 9)}{x^4} = \frac{(x^2 + 3)(x + 3)(x - 3)}{x^4}$$

1.5 : 32

$$\left(\frac{m^{-2}n^3}{m^4n^{-1}}\right)^2 = \left(\frac{n^4}{m^6}\right)^2 \text{ simplify inside parentheses first}$$
$$= \frac{n^8}{m^{12}}$$

1.5 : 40

$$\frac{1-x}{x^{-1}-1} = \frac{1-x}{\frac{1}{x}-1} \cdot \frac{x}{x} = \frac{x(1-x)}{1-x} = x$$

1.6 : 18

$$\left(v^{-3/4}\right)^8 = v^{-6} = \frac{1}{v^6}$$

1.7 : 42

$$2a^3\sqrt[3]{8a^8b^{13}} = 2a^3\sqrt[3]{2^3a^6b^{12} \cdot a^2b} = 2a \cdot 2a^2b^4\sqrt[3]{a^2b} = 4a^3b^4\sqrt[3]{a^2b}$$

1.7 : 96

$$T = 2\pi\sqrt{\frac{L}{g}} = 2\pi\sqrt{\frac{L}{g} \cdot \frac{g}{g}} = 2\pi\sqrt{\frac{Lg}{g^2}} = 2\pi\frac{\sqrt{Lg}}{\sqrt{g^2}} = \frac{2\pi\sqrt{Lg}}{g}$$

2.1 : 20

$$\frac{2x-3}{x+1} = 2 - \frac{3x-1}{x+1}$$

$$\frac{2x-3}{x+1}(x+1) = 2(x+1) - \frac{3x-1}{x+1}(x+1)$$

$$2x-3 = 2x+2 - (3x-1)$$

$$2x-3 = -x+3$$

$$3x = 6$$

$$x = 2$$

2.1 : 46

Let x = the number, then

$$\frac{1}{2}x + 6 = \frac{2}{3}x$$

$$\frac{2}{3}x - \frac{1}{2}x = 6$$

$$4x - 3x = 36$$

$$x = 36$$

2.2 : 10

$$1. \quad 12m - 11n = 2$$

$$12m = 11n + 2$$

$$m = \frac{11n + 2}{12}$$

$$2. \quad 18m + 7n = 3$$

$$18\left(\frac{11n + 2}{12}\right) + 7n = 3$$

$$18(11n + 2) + 84n = 36$$

$$198n + 36 + 84n = 36$$

$$282n = 0$$

$$n = 0$$

$$\left(\frac{1}{6}, 0\right)$$

2.2 : 34

$$1. \quad 800G + 500S = 62,250$$

$$500S = 62,250 - 800G$$

$$S = 124.5 - 1.6G$$

$$\begin{aligned}
2. \quad & 800G + 1000S = 76,500 \\
& 800G + 1000(124.5 - 1.6G) = 76,500 \\
& 800G + 124,500 - 1600G = 76,500 \\
& -800G = -48,000 \\
& G = 60
\end{aligned}$$

Final: 60 hours at Green Bay and 28.5 hours at Sheboygan.

2.3 : 28

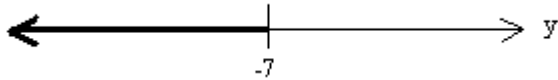
$$\frac{y-3}{4} - 1 > \frac{y}{2}$$

$$y - 3 - 4 > 2y$$

$$y - 7 > 2y$$

$$-y > 7$$

$$y < -7; (-\infty, -7);$$



Algebra II - Test 2 Solutions

2.4 : 46

$$|5y + 2| \geq 8$$

$$5y + 2 \leq -8 \text{ or } 5y + 2 \geq 8$$

$$5y \leq -10 \qquad 5y \geq 6$$

$$y \leq -2 \qquad y \geq \frac{6}{5}$$

$$y \geq 1.2$$

$$y \leq -2 \text{ or } y \geq 1.2; (-\infty, -2] \cup [1.2, \infty)$$

2.5 : 30

$$(-2 - \sqrt{-36}) - (4 + \sqrt{-49}) = -2 - 6i - 4 - 7i = -6 - 13i$$

2.6 : 40

$$x^2 + 2x = 2$$

$$x^2 + 2x + 1 = 2 + 1$$

$$(x + 1)^2 = 3$$

$$x + 1 = \pm\sqrt{3}$$

$$x = -1 \pm \sqrt{3}$$

2.7 : 18

$$x = \sqrt{5x^2 + 9}$$

$$x^2 = 5x^2 + 9$$

$$0 = 4x^2 + 9$$

$$4x^2 = -9$$

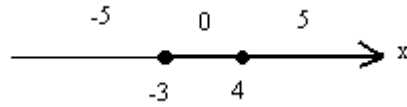
$$x^2 = -\frac{9}{4}$$

$$x = \pm\sqrt{\frac{-9}{4}}$$

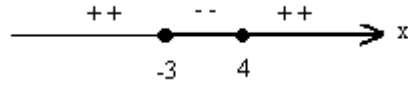
$$x = \pm\frac{3}{2}i$$

2.8 : 18

$$\frac{x^2 - x - 12}{x^2 + 4} \leq 0$$



$$\frac{(x-4)(x+3)}{x^2 + 4} \leq 0$$



zeros: -3, 4

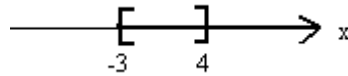
test numbers: -5, 0, 5

value: 0.62, -3, 0.28

sign: +, -, +

$$\frac{x^2 - x - 12}{x^2 + 4} \leq 0 \text{ on } [-3, 4]$$

$$-3 \leq x \leq 4$$



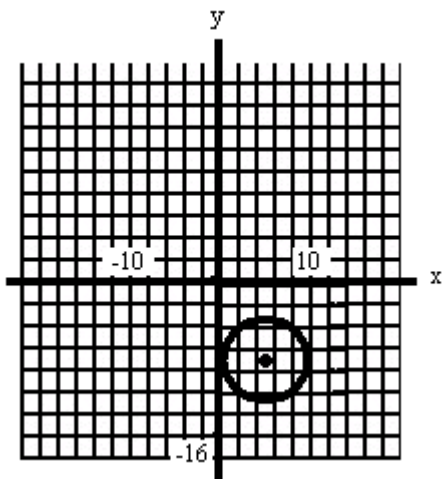
3.1 : 56

$$(x-5)^2 + (y+7)^2 = 15$$

$$(x-5)^2 + (y-(-7))^2 = (\sqrt{15})^2$$

from which $(h, k) = (5, -7)$

and $r = \sqrt{15}$



3.2 : 42

$(-1,3)$; perpendicular to $y = -\frac{3}{5}x + 2$

$m = -\frac{3}{5}$; perpendicular slope = $\frac{5}{3}$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{5}{3}(x - (-1))$$

$$y - 3 = \frac{5}{3}x + \frac{5}{3}$$

$$3y - 9 = 5x + 5$$

$$5x - 3y = -14$$

3.3 : 48

$$G(m) = \frac{1 - 2m}{m^2 + 3}$$

$$m^2 + 3 \neq 0$$

domain: all real numbers

Algebra II - Test 3 Solutions

3.4 : 18

$$f(-3) = -2 \Rightarrow (-3, -2) \quad m = \frac{-2 - 4}{-3 - 5} = \frac{-6}{-8} = \frac{3}{4}$$

$$f(5) = 4 \Rightarrow (5, 4)$$

$$y - y_1 = m(x - x_1)$$

$$y - 4 = \frac{3}{4}(x - 5)$$

$$y - 4 = \frac{3}{4}x - \frac{15}{4}$$

$$y = \frac{3}{4}x - \frac{15}{4} + \frac{16}{4}$$

$$y = \frac{3}{4}x + \frac{1}{4}$$

$$f(x) = \frac{3}{4}x + \frac{1}{4}$$

3.5 : 86

$$P(x) = R(x) - C(x) = 50x - \frac{x^2}{100} - (20x + 40,000)$$

$$P(x) = 50x - \frac{x^2}{100} - 20x - 40,000$$

$$= 30x - \frac{x^2}{100} - 40,000$$

$$P(p) = 30(5000 - 100p) - \frac{(5000 - 100p)^2}{100} - 40,000$$

which simplifies to:

$$P(p) = -100p^2 + 7000p - 140,000$$

4.2 : 42

$$P(x) = x^3 - 4x^2 - 9x + 36$$

possible rational zeros: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 5, \pm 6, \pm 9, \pm 12, \pm 18, \pm 36$

$$\begin{array}{rrrr} 1 & -4 & -9 & 36 \\ & -3 & 21 & -36 \\ -3 \overline{) 1} & -7 & 12 & 0 \end{array}$$

$$\begin{array}{rrr} & 3 & -12 \\ 3 \overline{) 1} & -4 & 0 \end{array}$$

$$\Rightarrow x - 4 = 0, x = 4$$

Zeros: -3, 3, 4

4.3 : 48

$$\ell = \frac{40 - 3x}{2}, w = 20 - 2x, h = x$$

$$V = \ell wh$$

$$V(x) = (20 - 1.5x)(20 - 2x)x$$

$$x(400 - 40x - 30x + 3x^2) = 500$$

$$3x^3 - 70x^2 + 400x - 500 = 0$$

$$\text{Graph } y_1 = 3x^3 - 70x^2 + 400x - 500$$

The zeros are at $x \approx 1.741$ and $x \approx 6.234$. The values of x that would result in a box with a volume of 500 cubic inches are 1.7 inches and 6.2 inches.

4.4 : 20

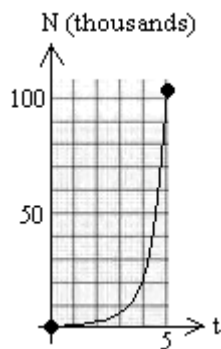
$$g(x) = \frac{3x}{x^4 + 2x^2 + 1}$$

no vertical asymptote since $x^4 + 2x^2 + 1 > 0$ for all x

horizontal asymptote: $y = 0$, $\deg n(x) < \deg d(x)$

5.1 : 60

$$P = P_0 2^{t/d} = 100 \cdot 2^{t/1/2} = 100 \cdot 2^{2t}$$



5.2 : 12

$$\frac{e^{4-3x}}{e^{2-5x}} = e^{4-3x-(2-5x)} = e^{4-3x-2+5x} = e^{2x+2}$$

5.2 : 52

$$A = Pe^{rt}, P = \$7500, r = 8.35^\circ$$

$$(A) \quad A(5.5) = 7500e^{0.0835(5.5)} = \$11,871.65$$

$$(B) \quad A(12) = 7500e^{0.0835(12)} = \$20,427.93$$

5.3 : 42

$$\log_b 8 = 0.5$$

$$b^{0.5} = 8$$

$$(b^{0.5})^2 = 8^2$$

$$b = 64$$

Algebra II – Semester Final Solutions

2.2 : 32

$$(1) \quad x + y = 20,000 \Rightarrow y = 20,000 - x$$

$$(2) \quad 0.08x + 0.12y = 0.11(20,000)$$

$$0.08x + 0.12(20,000 - x) = 2200$$

$$0.08x + 2400 - 0.12x = 2200$$

$$-0.04x = -200$$

$$x = 5000$$

$$(1) \quad y = 20,000 - 5000$$

$$y = 1500$$

Invest \$5000 at 8% and \$15,000 at 12%

2.6 : 36

$$9x^2 + 9x = 4$$

$$9x^2 + 9x - 4 = 0$$

$$(3x + 4)(3x - 1) = 0$$

$$3x + 4 = 0, \quad 3x - 1 = 0$$

$$3x = -4 \quad 3x = 1$$

$$x = -\frac{4}{3} \quad x = \frac{1}{3}$$

3.3 : 24

$$G(2) - g(-3) \text{ where } G(u) = u^2 + u - 2, g(t) = 3 - 2t$$

$$G(2) - g(-3) = (2^2 + 2 - 2) - (3 - 2(-3))$$

$$= 4 - 9$$

$$= -5$$

4.1 : 14

$$\begin{array}{r} -x^2 + 4 \\ x - 2 \overline{) -x^3 + 2x^2 + 4x - 8} \\ \underline{-x^3 + 2x^2} \\ 0 + 4x - 8 \\ \underline{4x - 8} \\ 0 \end{array}$$

4.2 : 42

$$P(x) = x^3 - 4x^2 - 9x + 36$$

possible rational zeros: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 5, \pm 6, \pm 9, \pm 12, \pm 18, \pm 36$

$$\begin{array}{r|rrrr} & 1 & -4 & -9 & 36 \\ & & -3 & 21 & -36 \\ -3 & 1 & -7 & 12 & 0 \end{array}$$

$$\begin{array}{r|rr} & 3 & -12 \\ 3 & 1 & -4 & 0 \end{array}$$

$$\Rightarrow x - 4 = 0, x = 4$$

Zeros: $-3, 3, 4$

4.4 : 16

$$r(x) = \frac{5x^2 - 7x}{2x^2 - 50}$$

vertical asymptote: $2x^2 - 50 = 0$

$$2x^2 = 50$$

$$x^2 = 25$$

$$x = \pm 5$$

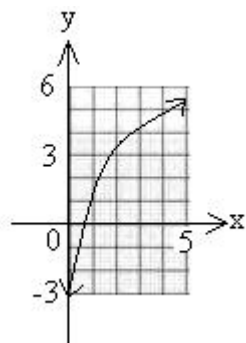
horizontal asymptote: $y = \frac{5}{2}$ since $n(x)$ and $d(x)$ have same degree

5.3 : 38

$$\log_8 x = \frac{2}{3}$$

$$x = 8^{2/3} = 4$$

5.4 : 38



$$y = 2 \ln x + 2$$

Trigonometry - Test 1 Solutions

6.1 : 18

$$\frac{\pi}{6} \cdot \frac{180^\circ}{\pi} = 30^\circ$$

$$\frac{\pi}{3} \cdot \frac{180^\circ}{\pi} = 60^\circ$$

$$\frac{\pi}{2} \cdot \frac{180^\circ}{\pi} = 90^\circ$$

$$\frac{2\pi}{3} \cdot \frac{180^\circ}{\pi} = 120^\circ$$

$$\frac{5\pi}{6} \cdot \frac{180^\circ}{\pi} = 150^\circ$$

$$\pi \cdot \frac{180^\circ}{\pi} = 180^\circ$$

6.1 : 48

$$\frac{8\pi}{3} - 2\pi = \frac{2\pi}{3} \rightarrow \frac{8\pi}{3} \text{ is coterminal with } \frac{2\pi}{3}$$

$$\frac{\pi}{2} < \frac{2\pi}{3} < \pi, \frac{2\pi}{3} \text{ is in Quadrant II} \rightarrow \frac{8\pi}{3} \text{ is in Quadrant II}$$

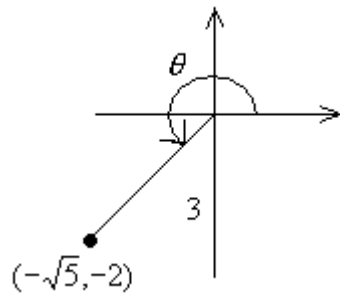
6.2 : 30

$$\beta = 90^\circ - \alpha = 90^\circ - 35.73^\circ = 54.27^\circ$$

$$\tan 35.73^\circ = \frac{\text{Opp}}{\text{Adj}} = \frac{a}{6.482} \Rightarrow a = 6.482 \tan 35.73^\circ = 4.663$$

$$\cos 35.73^\circ = \frac{\text{Adj}}{\text{Hyp}} = \frac{6.482}{c} \Rightarrow c = \frac{6.482}{\cos 35.73^\circ} = 7.985$$

6.3 : 46



$$\sin \theta = -\frac{2}{3}$$

$$3^2 = (-2)^2 + a^2$$

$$a = -\sqrt{5}$$

$$\cos \theta = \frac{-\sqrt{5}}{3}$$

$$\tan \theta = \frac{-2}{-\sqrt{5}} = \frac{2}{\sqrt{5}}$$

$$\csc \theta = -\frac{3}{2}$$

$$\sec \theta = -\frac{3}{\sqrt{5}}$$

$$\cot \theta = \frac{\sqrt{5}}{2}$$

6.4 : 84

$$(A) \quad \sin \frac{\pi}{6} = \frac{y}{1} \qquad \cos \frac{\pi}{6} = \frac{x}{1}$$

$$\frac{1}{2} = \frac{y}{1} \qquad \frac{\sqrt{3}}{2} = x$$

$$y = \frac{1}{2} \qquad x = \frac{\sqrt{3}}{2}$$

$$(B) \quad \sin \frac{\pi}{4} = \frac{y}{1} \qquad \cos \frac{\pi}{4} = \frac{x}{1}$$

$$\frac{\sqrt{2}}{2} = y \qquad \frac{\sqrt{2}}{2} = x$$

$$y = \frac{\sqrt{2}}{2} \qquad x = \frac{\sqrt{2}}{2}$$

6.5 : 48

$$\cot x \sec x = \frac{\cos x}{\sin x} \cdot \frac{1}{\cos x} = \frac{1}{\sin x} = \csc x$$

6.7 : 24

From the graph,

$$\text{Amplitude} = \frac{1}{2} \text{ and period} = 4 \Rightarrow \frac{2\pi}{b} = 4 \Rightarrow b = \frac{\pi}{2} \Rightarrow y = -\frac{1}{2} \sin\left(\frac{\pi x}{2}\right)$$

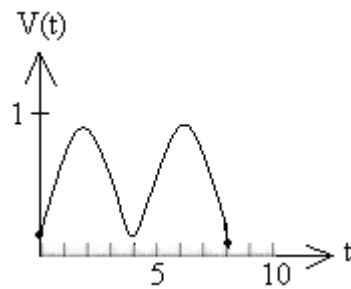
$$-2 \leq x \leq 4$$

6.7 : 76

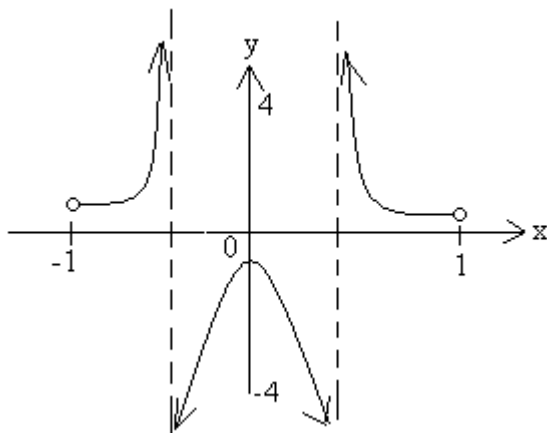
$$A = 0.37$$

$$P = \frac{2\pi}{\frac{\pi}{2}} = 4$$

The graph shows the volume of air in the lungs t seconds after exhaling.



6.8 : 14



$$y = \csc\left(\pi x - \frac{\pi}{2}\right), -1 < x < 1,$$

has period $= \frac{2\pi}{\pi} = 2$ and

phase shift $= \frac{1}{2}$

6.9 : 36

$$\arctan(-1) = -45^\circ$$

Trigonometry - Test 2 Solutions

7.1 : 20

$$\text{Verify: } (\sin x + \cos x)^2 = 1 + 2 \sin x \cos x$$

$$\begin{aligned} (\sin x + \cos x)^2 &= \sin^2 x + 2 \sin x \cos x + \cos^2 x \\ &= \sin^2 x + \cos^2 x + 2 \sin x \cos x = 1 + 2 \sin x \cos x \end{aligned}$$

7.1 : 44

$$\text{Verify: } \sec^2 x + \csc^2 x = \sec^2 x \csc^2 x$$

$$\begin{aligned} \sec^2 x + \csc^2 x &= \frac{1}{\cos^2 x} + \frac{1}{\sin^2 x} \\ &= \frac{\sin^2 x + \cos^2 x}{\sin^2 x \cos^2 x} \\ &= \frac{1}{\cos^2 x \sin^2 x} \\ &= \frac{1}{\cos^2 x} \cdot \frac{1}{\sin^2 x} \\ &= \sec^2 x \csc^2 x \end{aligned}$$

7.1: 64

$$\begin{aligned} \text{Verify: } \frac{\sin x}{1 - \cos x} &= \frac{1 + \cos x}{\sin x} \\ \frac{1 + \cos x}{\sin x} &= \frac{1 + \cos x}{\sin x} \cdot \frac{1 - \cos x}{1 - \cos x} \\ &= \frac{1 - \cos^2 x}{\sin x(1 - \cos x)} \\ &= \frac{\sin^2 x}{\sin x(1 - \cos x)} \\ &= \frac{\sin x}{1 - \cos x} \end{aligned}$$

7.2 : 20

$$\begin{aligned} \tan(x - 45^\circ) &= \frac{\tan x - \tan 45^\circ}{1 + \tan x \tan 45^\circ} \\ &= \frac{\tan x - 1}{1 + (\tan x)(1)} \\ &= \frac{\tan x - 1}{1 + \tan x} \end{aligned}$$

7.2 : 36

$$\begin{aligned}
 \text{Verify: } \cot(x-y) &= \frac{\cot x \cot y + 1}{\cot y - \cot x} \\
 \cot(x-y) &= \frac{\cot(x-y)}{\sin(x-y)} \\
 &= \frac{\cos x \cos y + \sin x \sin y}{\sin x \cos y - \sin y \cos x} \cdot \frac{1}{\frac{\sin x \sin y}{1}} \\
 &= \frac{\cot x \cot y + 1}{\cot y - \cot x}
 \end{aligned}$$

7.3 : 2

$$\begin{aligned}
 \text{Verify: } \sin 2x &= 2 \sin x \cos x \text{ for } x = 45^\circ \\
 \sin 2x &= \sin(2 \cdot 45^\circ) = \sin 90^\circ = 1 \\
 2 \sin x \cos x &= 2 \sin 45^\circ \cos 45^\circ = 2 \cdot \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2}}{2} = 1
 \end{aligned}$$

7.3 : 16

$$\begin{aligned}
 \text{Verify: } \sin 2x &= (\tan x)(1 + \cos 2x) \\
 &= \frac{\sin x}{\cos x} (1 + 2 \cos^2 x - 1) \\
 &= \frac{\sin x}{\cos x} (2 \cos^2 x) \\
 &= 2 \sin x \cos x \\
 &= \sin 2x
 \end{aligned}$$

7.3 : 22

$$\begin{aligned}
 \text{Verify: } \cos^2 \frac{x}{2} &= \frac{1 + \cos x}{2} \\
 &= \left(\pm \sqrt{\frac{1 + \cos x}{2}} \right)^2 \\
 &= \frac{1 + \cos x}{2}
 \end{aligned}$$

7.4 : 50 (part A only)

$$\begin{aligned}
 &0.25 \cos(256\pi) - 0.25 \cos(288\pi) \\
 &= 0.25 [\cos(256\pi) - \cos(288\pi)]
 \end{aligned}$$

$$\begin{aligned}
&= 0.25 \left[-2 \sin \left(\frac{256\pi + 288\pi}{2} \right) \sin \left(\frac{256\pi - 288\pi}{2} \right) \right] \\
&= -\frac{1}{2} \sin(272\pi) \sin(-16\pi) \\
&= \frac{1}{2} \sin(272\pi) \sin(16\pi)
\end{aligned}$$

7.5 : 24

$$\begin{aligned}
\cos x &= \cot x, 0 \leq x < 2\pi \\
&= \frac{\cos x}{\sin x} \\
\sin x \cos x - \cos x &= 0 \\
\cos x (\sin x - 1) &= 0 \\
\cos x = 0 \qquad \sin x - 1 &= 0
\end{aligned}$$

$$x = \frac{\pi}{2}, \frac{3\pi}{2} \qquad \sin x = 1$$

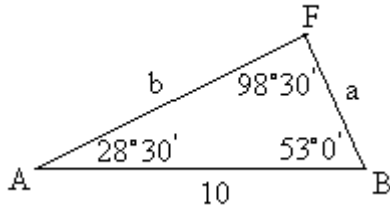
$$x = \frac{\pi}{2}$$

Trigonometry – Semester Final Exam Solutions

6.4 : 30

$$\sec\left(-\frac{\pi}{4}\right) = \sqrt{2}$$

8.1 : 38



$$\frac{b}{\sin 53^\circ} = \frac{a}{\sin 28^\circ 30'} = \frac{10}{\sin 98^\circ 30'}$$

$$b = 8.08 \text{ miles from } A$$

$$a = 4.82 \text{ miles from } B$$

8.2 : 38

After 2 hours, Plane A has traveled 800 miles, Plane B 1000 miles. The angle between them is 45° .

$$c = \sqrt{1000^2 + 800^2 - 2(1000)(800)\cos 45^\circ} \approx 713 \text{ mi}$$

8.3 : 26

$$|\vec{v}| = \sqrt{15^2 + 3.9^2 - 2(15)(3.9)\cos(25^\circ + 45^\circ)} \approx 14 \text{ mph}$$

$$\frac{3.9}{\sin \theta} = \frac{14}{\sin(70^\circ)} \Rightarrow \theta = 15^\circ$$

$$\text{heading} = 25^\circ + 15^\circ = 40^\circ$$

$$14 \text{ mph at } 40^\circ$$

8.4 : 50

$$\text{Angle } ABC = 30^\circ$$

$$BC \sin 30^\circ = 1000 \Rightarrow BC = 2000 \text{ kg, tension}$$

$$BC \cos 30^\circ = AB \Rightarrow AB = 2000 \cos 30^\circ \approx 1730 \text{ kg, compression}$$

8.5 : 20

$$(r, \theta) = \left(3, -\frac{3\pi}{7}\right)$$

$$x = r \cos \theta = 3 \cos \left(-\frac{3\pi}{7} \right) \approx 0.668$$

$$y = r \sin \theta = 3 \sin \left(-\frac{3\pi}{7} \right) \approx -2.925$$

8.6 : 24

$$(\sqrt{3} + i)^2 = 3 + 2i\sqrt{3} + i^2$$

$$= 3 + 2i\sqrt{3} - 1$$

$$= 2 + 2i\sqrt{3}$$

$$\sqrt{3} + i : r = 2, \theta = 30^\circ \Rightarrow 2e^{30^\circ i}$$

$$(2e^{30^\circ i})^2 = 2e^{30^\circ i} \cdot 2e^{30^\circ i} = 4e^{60^\circ i}$$

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