

## EXAM 2 Study Guide

- **1 hour and 25 minutes.** It will start at 9:10 am and end at 10:35 am.
- This test will take place during regularly scheduled class time.
  - You will need to be logged in to class via Zoom. You will also need to have your camera and microphone both functioning and turned **ON** for the duration of the test.
    - Please plan ahead for this and try to ask family members, roommates, to not disrupt you during the test.
    - ★ ■ If you have any trouble arranging this, email me immediately and schedule a time for us to have a conference call.
- I will post the test to Canvas at 9:10 am.
- You will need to have 5-10 blank pieces of paper with you at the beginning of class to write your solutions to the test. Bring your writing utensils as well. You do not need a stapler.
  - I ask that you write your solutions on only one side of the page (aka the "front side" of page only). This helps when photographing your work.
- You will need to submit a PDF of your test solutions by 11:05 am.
  - This should give you plenty of time to write full solutions to the test; take pictures of each of your pages; and submit the test as ONE PDF file.
  - **Point deductions for submitting your test late:**
    - 11:06--11:15 am: I will deduct 10 points from your score
    - 11:16am--?: for each additional minute late, I will deduct a point from your score.  
Ex: if you submit the test at 11:20 am, then I will deduct 14 points from your score (if you get a grade of 86 then your adjusted score will be 72 after the lateness deduction)
- **Bring scientific calculator!** I will do a calculator check to make sure you do not have graphing functions.
- You will be asked to hand-write the following **"honor code"** at the beginning of your test and sign your name below it:
  - On my honor, by printing and signing my name, I vow to neither receive nor give any unauthorized assistance on this examination. I understand what my professor has deemed appropriate and inappropriate for this test and vow to follow these rules.
- **Allowed Materials:**
  - Blank paper to write your test solutions
  - Writing utensils (pencils, erasers, etc)
  - textbook (open book; but only if it is a physical copy, you cannot use an e-book on your computer)
  - Class notes (you can have your hand-written class notes)
- **Materials you are NOT allowed** to use during the examination:
  - Your cell phone (you can't text or take phone calls)
  - Digital or printed out notes: the slides, the study guides, etc (only your textbook and hand-written class notes)
  - You cannot consult your ICA or HW
  - You cannot receive or give any outside help (no getting help from a sibling or friend either in person, via chat, message board, text message or any form of communication--again--you will be on camera the entire time so I will be looking for suspicious behavior)

handwrite  
on Exam  
beginning

- You cannot use your computer to look up anything using the internet (don't google; don't consult "homework help" websites, etc)
  - I know all the "help" sites as well and will look up to check if students are cheating by copying answers
- Showing work. Correct answers without showing work, or clearly "copied" work will receive zero points; and possible
- You might be asked to have a 1-1 conference to defend your work and explain to me all your steps on test questions.
- I hate to have to write out all these rules and to have to "police" for bad behavior. Understand that I expect the majority of students to do their work honestly but a few "bad seeds" can ruin things for all of us. However, I want to make sure the rules are clear and fair for all students.
- **Submitting your ICA and HW:**
  - You will need to submit your HW as one PDF file via Canvas by 9:10 am. I highly recommend that you do this early (night before is best) so you don't have to worry about it during the test.
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### Material Covered

- **Math 110A material and Exam 1**
  - Still responsible for knowing all of Exam 1 Material (Ch 6 and 7.1) plus all of the material from 110A.
  - Still need to know, inverse trig functions (both when you should use a calculator vs when you should use the triangle approach to get an exact answer)

### Chapter 7

- Sections 7.1, 7.2, 7.3, 7.4, 7.5

#### Key Ideas:

- difference between Trig Identity VS Trig Equation
- Proving Trig Identities are true
- Solving Trig Equations
- Know how to write infinitely many solutions to trig equations using the "k is an integer" or " $k \in \mathbb{Z}$ "

#### Memorizing a ton of trig identities

- Ch 6 ones: reciprocal IDs, Pythagorean IDs, Even/Odd IDs, M
- New in Ch 7: Must know/memorize:

- Cofunction IDs  $\cos(\pi/2 - x) = \sin(x)$

- Add/Subtract Formulas for sin/cos/tan (important)

- Double Angle formulas (important!!!)  $\Rightarrow \sin(2x) = 2 \sin(x) \cos(x)$

- Formulas for Lowering Powers (important)

- Ch 7 formulas that you need to know how to use and solve problems with, but you do not need to memorize them

#### Half-Angle formulas

- These are cool and useful, I might ask you to prove/derive these from other formulas (e.g. the tangent one is in the book)

Proof  
LHS (or RHS)  
= .....  
= ...  
= ...  
= RHS (or LHS).  $\square$

$$\sin(x+y) = \sin(x)\cos(y) + \cos(x)\sin(y)$$

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

Key: Trig ID (7.1-7.3) Trig EQ (7.4, 7.5)

some

all values

- Product-to-Sum
- Sum-to-Product
- Solving Equations
  - By factoring ✓
  - By raising both sides to a power (must check answers with original eq when you use this technique) *warning: remove "false roots"*
  - By using trig identities to rewrite eq in a form that makes it solvable using above techniques
  - Reminder: trig eq can have infinitely many solutions!
    - However, pay careful attention to how the problem is stated since I could ask for solutions in a specific interval
  - EXACT vs APPROXIMATE solutions
    - Pay attention to these
    - Examples where inverse trig are needed
  - Be able to set-up equations to solve for when two functions intersect.
- Chapter 7 Practice Test
  - Concept Check, pg 613-614: 1-12 all
  - Chapter 7 Test, pg 616: **You should do all of it**
    - ICA\*: 6, 8, 9, 10, 13, 14, 16, 17, 18, 21, 22
    - \* This is not due and not collected, it's just for you to use as a review

Class # 7, 19, 20, 21

**#7** Prove:  $\left( \sin\left(\frac{x}{2}\right) + \cos\left(\frac{x}{2}\right) \right)^2 = 1 + \sin(x).$

Proof LHS =  $\left( \sin\left(\frac{x}{2}\right) + \cos\left(\frac{x}{2}\right) \right)^2$

$$= \underbrace{\sin^2\left(\frac{x}{2}\right)} + \underbrace{2 \cdot \sin\left(\frac{x}{2}\right) \cos\left(\frac{x}{2}\right)}_{\text{double angle}} + \underbrace{\cos^2\left(\frac{x}{2}\right)}_{\text{Pythag.}}$$

$$= \left( \underbrace{\sin^2\left(\frac{x}{2}\right) + \cos^2\left(\frac{x}{2}\right)}_{=1 \text{ by Pythag}} \right) + \underbrace{2 \sin\left(\frac{x}{2}\right) \cos\left(\frac{x}{2}\right)}_{= \sin\left(2\left(\frac{x}{2}\right)\right) \text{ double angle}}$$

$$= 1 + \sin\left(2\left(\frac{x}{2}\right)\right)$$

$$= 1 + \sin(x)$$

$$= \text{RHS.} \quad \square$$

#19

Solve:

a) all

b)  $[0, 2\pi)$

Give exact when possible.

$$2 \cos^2(x) + \cos(2x) = 0$$

Sol)  $2 \cos^2(x) + \underbrace{\cos(2x)}_{\text{double angle}} = 0$

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

$$= 1 - 2 \sin^2(x)$$

$$= \boxed{2 \cos^2(x) - 1}$$

$$2 \cos^2(x) + (2 \cos^2(x) - 1) = 0$$

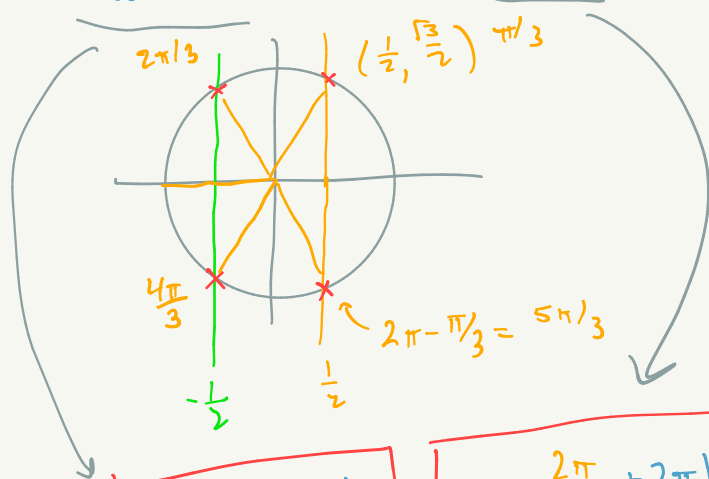
$$\begin{array}{rcc} 4 \cos^2(x) & - & 1 = 0 \\ +1 & & +1 \end{array}$$

$$\frac{4 \cos^2(x)}{4} = \frac{1}{4}$$

$$\sqrt{\cos^2(x)} = \sqrt{\frac{1}{4}}$$

$$\cos(x) = \pm \frac{1}{2}$$

$$\cos(x) = \frac{1}{2} \quad \text{or} \quad \cos(x) = -\frac{1}{2}$$



b) solutions inside  $[0, 2\pi)$

$$\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}}$$

$$x = \frac{\pi}{3} + 2\pi k$$

$$x = \frac{5\pi}{3} + 2\pi k$$

$$k \in \mathbb{Z}$$

$$x = \frac{2\pi}{3} + 2\pi k$$

$$x = \frac{4\pi}{3} + 2\pi k$$

$$k \in \mathbb{Z}$$

a)

all solutions!

Solve:

#20

$$2 \tan\left(\frac{x}{2}\right) - \csc(x) = 0$$