**Math 229: Homework Set 3** **Name:**_____

_____/ 20 **Class time:** _____

**Requirements: In order to receive credit on homework problems, you must**

- Write down the original problem, within reason.
- Work out the problem, clearly showing your work.
- Check your answer in the back of the book. If your answer is incorrect, then you need to go back to find and fix the error.

**Self-Assessment:** Determine total number of correctly done problems (they don't have to be done correctly the first time…just make sure you find and fix any errors in your work!) and put that score in the last column.

If you give credit for a problem that hasn't been completed, you will lose 1 point on the overall grade (for example, if you put down 9/9 in Assignment 1 but have completed only 6 problems, your entire score on the homework packet will lose 3 points). **Please be honest and accurate in your assessment.**

Homework is due on the day of the exam.

| | Read this section: | Do these problems: | Completed/ Total |
|---|---|---|---|
| 1 | **Section 9.5: Solving Equations (Part 1)** Read pages 739 – 745 only | 9.5 Exercises, page 750:<br>• Concepts: 1<br>• Trig equations (be sure to give the general solution to each equation!)<br>o Basic: 5, 7, 9, 13, 15<br>o Solve by square roots: 11, 28, 29<br>o Solve by factoring: 23, 25, 41<br>o Using a calculator: 73 | ☐ /13 |
| 2 | **Section 9.5: Solving Trig Equations, Multiple Angles (Part 2)**<br><br>Discussed on page 747 but we'll approach using the General Solution | 9.5 Exercises, page 750:<br>• Trig Equations with Multiple Angles: 17, 18, 20, 21, 22<br><br>Note: Give the General Solution to each of these equations. Answers are on the next page! | ☐ /5 |
| 3 | **Section 9.1: Identities** | 9.1 Exercises, page 704:<br>• Concepts: 4 (see notes for answer!)<br>• Simplify: 5 – 15 odd, , 17, 21, 23<br>• Verify (prove or disprove): 29, 33, 35, 37, 39 | ☐ /15 |
| 4 | **Section 9.2: Sum and Difference Identities** | 9.2 Exercises, page 718:<br>• Find exact values: 5, 7, 9<br>• Simplify: 11, 13, 15, 17, 18, 19, 22, 23<br>• Verify identity with graph (use Desmos!): 37, 38, 39<br>• Verify identity using algebra: 49, 53, 55 | ☐ /17 |
| 5 | **Section 9.3: Double Angle, Half Angle Identities** | 9.3 Exercises, page 730:<br>• Concepts: 1, 2<br><br>IMPORTANT! There are many ways to get the answer to the following problems. The point of these problems is to practice with the identities so please use the specified identities!<br>• Double angles. **Use the Double Angle Identities for sine and cosine to work these problems:** 5, 9, 28 – 33 all<br>• Half angles: **Use the Half Angle Identities for sine and cosine to work these problems:** 20, 21, - 23<br>• Reduction: **Use the Reduction Identities for sine and cosine to work these problems:** 39, 41<br>• Verify Identities: 34, 35, 36, 55, 56, 58, 59, 61 | ☐ /24 |

| | | | |
|---|---|---|---|
| 6 | **Section 9.4: Sum-to-Product, Product-to-Sum Identities** | 9.4 Exercises: Look at the section and acknowledge that these identities exist! ☺ | ☐ /NA |
| 7 | **Section 9.5: Solving Equations Using Identities: (Part 3)** | 9.5 Exercises, page 751: Give the general solution for the even exercises. 52, 53, 79, 84, 89 | ☐ /5 |

**Even answers:**

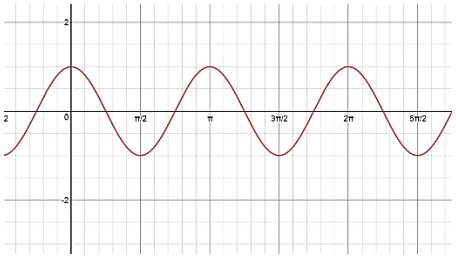
**Section 9.5:** (Note: There are other correct ways to write the General Solution!)

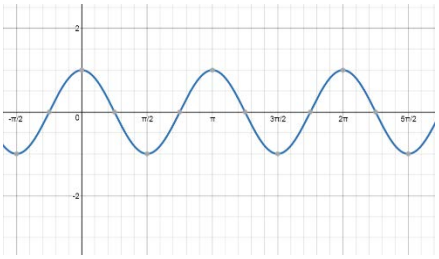
| | |
|---|---|
| #17: General Solution: $\theta = \frac{\pi}{18} + \frac{2\pi k}{3}, \quad k \in \mathbb{Z}$ <br> $\theta = \frac{5\pi}{18} + \frac{2\pi k}{3}, \quad k \in \mathbb{Z}$ | #18: General Solution: $\theta = \frac{\pi}{6} + \pi k, \quad k \in \mathbb{Z}$ <br> $\theta = \frac{\pi}{3} + \pi k, \quad k \in \mathbb{Z}$ |
| #20: General Solution $\theta = \frac{5\pi}{12} + \pi k, \quad k \in \mathbb{Z}$ <br> $\theta = \frac{7\pi}{12} + \pi k, \quad k \in \mathbb{Z}$ | #21: General Solution: $\theta = \frac{1}{6} + 2k, \quad k \in \mathbb{Z}$ <br> $\theta = \frac{5}{6} + 2k, \quad k \in \mathbb{Z}$ |
| #22: General Solution: $\theta = \frac{5}{6} + 10k, \quad k \in \mathbb{Z}$ <br> $\theta = \frac{55}{6} + 10k, \quad k \in \mathbb{Z}$ | #28: Particular solutions, $(0 \le \theta \le 2\pi)$ <br> $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ <br> General Solution: $\theta = \frac{\pi}{4} + \frac{\pi}{2}k, \quad k \in \mathbb{Z}$ |
| #52: General Solution: $n \in \mathbb{Z}$ <br> $x = n\pi \quad , x = \frac{\pi}{3} + 2\pi n, x = \frac{5\pi}{3} + 2\pi n$ | #84: $n \in \mathbb{Z}$ <br> $x = \frac{\pi}{2} + \pi n$ |

**Section 9.2:**

#18: $-\sin(3x)$ #22: $\frac{1}{2}$

#38: Note that the graph of $y = \cos(2x)$ matches the graph of $y = \cos^2(x) - \sin^2(x)$





This is not a proof that these two expressions are equivalent, but it offers strong evidence that they are!

**Section 9.3:**

#2: See notes from class

#20: $\sin\left(\frac{x}{2}\right)=\frac{1}{\sqrt{5}}, \quad \cos\left(\frac{x}{2}\right)=-\frac{2}{\sqrt{5}}, \quad \tan\left(\frac{x}{2}\right)=-\frac{1}{2}$

#28: $\cos\left(56^{\circ}\right)$ #30: $\cos\left(34^{\circ}\right)$ #32: $2\sin\left(16x\right)$

#34: Verify $\left(\sin t-\cos t\right)^2=1-\sin(2t)$

Starting with the LHS:

$$\left(\sin t-\cos t\right)^2 = \sin^2 t-2\sin t\cos t+\cos^2 t = \sin^2 t+\cos^2 t - 2\sin t\cos t = 1 - \sin 2t$$

#36: Verify $\cot x-\tan x=2\cot(2x)$

Starting with the RHS:

$$2\cot(2x)=\frac{2\cos(2x)}{\sin(2x)}=\frac{2\left(\cos^2 x-\sin^2 x\right)}{2\sin x\cos x}= \frac{\cos^2 x}{\sin x\cos x}-\frac{\sin^2 x}{\sin x\cos x} = \frac{\cos x}{\sin x}-\frac{\sin x}{\cos x} = \cot x - \tan x$$

#56: Verify $\cos(2a)=\frac{1-\tan^2 a}{1+\tan^2 a}$

Starting with the RHS:

$$\frac{1-\tan^2 a}{1+\tan^2 a}=\frac{1-\frac{\sin^2 a}{\cos^2 a}}{1+\frac{\sin^2 a}{\cos^2 a}}=\frac{\left(1-\frac{\sin^2 a}{\cos^2 a}\right)\cos^2 a}{\left(1+\frac{\sin^2 a}{\cos^2 a}\right)\cos^2 a}=\frac{\cos^2 a-\sin^2 a}{\cos^2 a+\sin^2 a}=\frac{\cos(2a)}{1}=\cos(2a)$$

#58: Verify $\left(\sin^2 x-1\right)^2=\cos(2x)+\sin^4 x$

Starting with the LHS:

$$\left(\sin^2 x-1\right)^2 = \sin^4 x-2\sin^2 x+1 = \sin^4 x+1-2\sin^2 x = \sin^4 x+\cos(2x)$$