Unit 8.3-8.5 Using Trigonometric Identities and Formulas

By the end of this unit, you should be able to:

- ☐ simplify trigonometric expressions
- ☐ establish identities
- ☐ use sum and difference formulas to find exact values
- ☐ use double-angle and half-angle formulas to find exact values
- ☐ derive double-angle and half-angle formulas

Assignments:

8.3A – Simplifying Trigonometric Expressions – pg. 625 #9-17odd
8.3B – "Level 1 Identities" – pg. 625 #19, 25, 27, 29, 31, 33, 45
8.3C – "Level 2 Identities" – pg. 625 #21, 23, 35, 41, 49, 73
8.3D – "Level 3 Identities" – pg. 625 #37, 43, 47, 53, 61, 65, 69, 71
8.4 – Sum and Difference Formulas – pg. 634 #9, 13, 15, 18, 21, 23, 25, 27, 31, 37, 45, 48, 54, 55, 59, 67
8.5 – Double- and Half-Angle Formulas – pg. 643 #7, 13, 19, 21, 23 and #1-4 below. Derive each formula using a sum/difference formulas as shown on pg. 637. #1. $\cos(2\theta)=1-2\sin^2\theta$ #2. $\sin(2\theta)=2\sin\theta\cos\theta$ Solve a double angle formula to derive each half-angle formula as shown on pg. 639-641 #3. $\sin\frac{\alpha}{2}=\pm\sqrt{\frac{1-\cos\alpha}{2}}$ #4. $\tan\frac{\alpha}{2}=\pm\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}$

Review Problems

#1-5 Use identities to find the exact value.

1. $\cos 75°$
2. $\tan\frac{\pi}{12}$
3. $\cos\frac{5\pi}{12}\cos\frac{7\pi}{12}-\sin\frac{5\pi}{12}\sin\frac{7\pi}{12}$
4. $\frac{\tan 40°-\tan 10°}{1+\tan 40°\tan 10°}$
5. $\cos^2 15°-\sin^2 15°$

6. Use the given information to find the exact value. $\sin\theta=-\frac{12}{13}$ $\frac{3\pi}{2}<\theta<2\pi$

   a) $\sin(2\theta)$ b) $\cos\left(\frac{\theta}{2}\right)$ c) $\tan\left(\theta-\frac{\pi}{4}\right)$

#7-9 Simplify.

7. $\tan(-x)\cot(-x)-\cos^2 x$
8. $(\csc\theta-1)(\csc\theta+1)$
9. $\frac{\sin x+1-\cos^2 x}{1+\sin x}$

#10-13 Establish the identity.

10. $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\csc\theta$
11. $\tan\theta+\cot\theta=\sec\theta\csc\theta$
12. $\cos(\pi-\theta)=-\cos\theta$
13. $\frac{1+\sec\theta}{1+\cos\theta}=\sec\theta$

14. Derive the formula. $\cos(2\theta)=2\cos^2\theta-1$

15. Solve a double angle formula to derive the half-angle formula. $\cos\frac{\alpha}{2}=\pm\sqrt{\frac{1+\cos\alpha}{2}}$