Sec 4.3 – Trigonometric Identities

Double Angle Identities

Name:

Starting with the sum and difference identities, create the double angle identities:

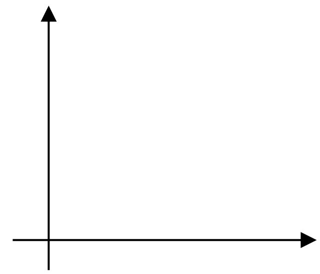
$sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$ $\qquad$ $cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$

1. Simplify $\sin(\theta + \theta)$
2. Simplify $\cos(\theta + \theta)$
3. Using the Pythagorean Identities, find 2 new ways to write the double angle formula for cosine.
4. Simplify $\tan(\theta + \theta)$ using the sum identity $\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$

Double-Angle Identities

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

5. Given that $\sin(\theta) = \frac{5}{13}$ and angle A lies in the first quadrant, find the exact value of each of the following:

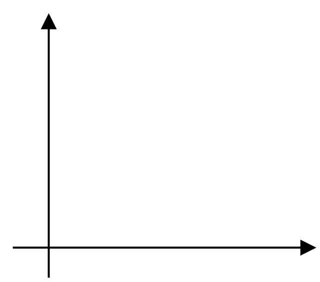


a. $\sin(2\theta)$

b. $\cos(2\theta)$

c. $\tan(2\theta)$

6. Given that $\cos(\theta) = \frac{5}{21}$ and angle A lies in the first quadrant, find the exact value of each of the following:



a. $\sin(2\theta)$

b. $\cos(2\theta)$

c. $\tan(2\theta)$

Simplify the following trigonometric expressions using the sum and difference identities.

7. $\cos\theta\sin\theta = \frac{\sin(2\theta)}{2}$

8. $\sin(2x) + 1 = (\sin x + \cos x)^2$

9. $\cos(2x) = (\cos x + \sin x)(\cos x - \sin x)$

10. $2\cos^2\theta = \cot\theta\sin 2\theta$