Math AA HL Chapter 7 Notes

Pythagorean Identities

$\sin^2\theta+\cos^2\theta=1$ $\quad 1+\cot^2\theta=\csc^2\theta$ $\quad \tan^2\theta+1=\sec^2\theta$

Use Pythagorean Identities to simplify or substitute in order to change an equation and make it easier to solve.

Compound Angle Identities (Sum or Difference)

$\sin(A+B)=\sin A\cos B+\cos A\sin B$ $\quad \sin(A-B)=\sin A\cos B-\cos A\sin B$

$\cos(A+B)=\cos A\cos B-\sin A\sin B$ $\quad \cos(A-B)=\cos A\cos B+\sin A\sin B$

$\tan(A+B)=\dfrac{\tan A+\tan B}{1-\tan A\tan B}$ $\quad \tan(A-B)=\dfrac{\tan A-\tan B}{1+\tan A\tan B}$

Double Angle Identities

$\sin 2\theta=2\sin\theta\cos\theta$

$\cos 2\theta=\cos^2\theta-\sin^2\theta=2\cos^2\theta-1=1-2\sin^2\theta$

$\tan 2\theta=\dfrac{2\tan\theta}{1-\tan^2\theta}$

Half Angle Identities

$\sin\dfrac{\theta}{2}=\pm\sqrt{\dfrac{1}{2}(1-\cos\theta)}$

$\cos\dfrac{\theta}{2}=\pm\sqrt{\dfrac{1}{2}(\cos\theta+1)}$

To express a function of the form $f(\theta)=a\sin\theta+b\cos\theta$ as a single trigonometric function:

1. Expand the desired form using the compound formula (if no form is given, use $k\cos(x-\alpha)^\circ$).
2. Compare the two sides to find $k\sin\alpha^\circ$ and $k\cos\alpha^\circ$ (write them in this order).
3. Square and add to find k^2
4. Divide to find $\tan\alpha^\circ$
5. Use the positivity diagram to find α°.