

5.1 Fundamental Identities

$$\begin{array}{lll} \cot \theta = \frac{1}{\tan \theta} & \sec \theta = \frac{1}{\cos \theta} & \csc \theta = \frac{1}{\sin \theta} \\ \tan \theta = \frac{\sin \theta}{\cos \theta} & \cot \theta = \frac{\cos \theta}{\sin \theta} & \\ \sin^2 \theta + \cos^2 \theta = 1 & \tan^2 \theta + 1 = \sec^2 \theta & 1 + \cot^2 \theta = \csc^2 \theta \\ \sin(-\theta) = -\sin \theta & \cos(-\theta) = \cos \theta & \tan(-\theta) = -\tan \theta \\ \csc(-\theta) = -\csc \theta & \sec(-\theta) = \sec \theta & \cot(-\theta) = -\cot \theta \end{array}$$

5.3, 5.4 Sum and Difference Identities

$$\begin{array}{ll} \cos(A - B) = \cos A \cos B + \sin A \sin B & \sin(A - B) = \sin A \cos B - \cos A \sin B \\ \cos(A + B) = \cos A \cos B - \sin A \sin B & \sin(A + B) = \sin A \cos B + \cos A \sin B \\ \tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} & \\ \tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B} & \end{array}$$

5.2 Cofunction Identities

$$\begin{array}{lll} \cos(90^\circ - \theta) = \sin \theta & \sin(90^\circ - \theta) = \cos \theta & \tan(90^\circ - \theta) = \cot \theta \\ \sec(90^\circ - \theta) = \csc \theta & \csc(90^\circ - \theta) = \sec \theta & \cot(90^\circ - \theta) = \tan \theta \end{array}$$

5.5 Multiple-Angle Identities

$$\begin{array}{ll} \cos 2A = \cos^2 A - \sin^2 A & \sin 2A = 2 \sin A \cos A \\ \cos 2A = 2 \cos^2 A - 1 & \tan 2A = \frac{2 \tan A}{1 - \tan^2 A} \\ \cos 2A = 1 - 2 \sin^2 A & \end{array}$$

5.6 Half-Angle Identities

$$\begin{array}{ll} \cos \frac{A}{2} = \sqrt{\frac{1 + \cos A}{2}} \text{ if } \frac{A}{2} \text{ is in Q I or Q IV} & \cos \frac{A}{2} = -\sqrt{\frac{1 + \cos A}{2}} \text{ if } \frac{A}{2} \text{ is in Q II or Q III} \\ \sin \frac{A}{2} = \sqrt{\frac{1 - \cos A}{2}} \text{ if } \frac{A}{2} \text{ is in Q I or Q II} & \sin \frac{A}{2} = -\sqrt{\frac{1 - \cos A}{2}} \text{ if } \frac{A}{2} \text{ is in Q III or Q IV} \\ \tan \frac{A}{2} = \sqrt{\frac{1 - \cos A}{1 + \cos A}} \text{ if } \frac{A}{2} \text{ is in Q I or Q III} & \tan \frac{A}{2} = -\sqrt{\frac{1 - \cos A}{1 + \cos A}} \text{ if } \frac{A}{2} \text{ is in Q II or Q III} \\ \tan \frac{A}{2} = \frac{\sin A}{1 + \cos A} & \tan \frac{A}{2} = \frac{1 - \cos A}{\sin A} \end{array}$$