

I. Double-Angle Formulas

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

A. Given that $\sin \theta = 3/5$ and $\pi/2 < \theta < \pi$, find the exact value using the double-angle formulas.

1. $\sin 2\theta$

2. $\cos 2\theta$

3. $\tan 2\theta$

II. Half-Angle Formulas

$$\begin{array}{ll} \sin \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{2}} & \tan \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{1 + \cos \alpha}} \\ \cos \frac{\alpha}{2} = \pm \sqrt{\frac{1 + \cos \alpha}{2}} & \tan \frac{\alpha}{2} = \frac{1 - \cos \alpha}{\sin \alpha} = \frac{\sin \alpha}{1 + \cos \alpha} \end{array}$$

A. Find the exact values using the half-angle formulas.

1. $\cos 15^\circ$

2. $\sin -15^\circ$

B. Given that $\cos \theta = -3/5$ and $\pi < \theta < 3\pi/2$, find the following.

3. $\sin \theta/2$

4. $\cos \theta/2$

5. $\tan \theta/2$