

Precalculus

Lesson 7.6: Double-angle and Half-angle Formulas

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And more identities.....

Double-Angle Formulas

$$\sin(2\theta) = 2 \sin \theta \cos \theta$$

$$\cos(2\theta) = \cos^2 \theta - \sin^2 \theta$$

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

$$\cos(2\theta) = 2 \cos^2 \theta - 1$$

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

Find the exact value using the double-angle formulas:

Given $\sin \theta = \frac{3}{5}$, $\frac{\pi}{2} < \theta < \pi$

$\sin 2\theta$

$\cos 2\theta$

$\tan 2\theta$

Half=Angle Formulas

$$\sin \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{2}}$$

$$\cos \frac{\alpha}{2} = \pm \sqrt{\frac{1 + \cos \alpha}{2}}$$

$$\tan \frac{\alpha}{2} = \pm \sqrt{\frac{1 - \cos \alpha}{1 + \cos \alpha}}$$

$$\tan \frac{\alpha}{2} = \frac{1 - \cos \alpha}{\sin \alpha} = \frac{\sin \alpha}{1 + \cos \alpha}$$

Find the exact values using the half-angle formulas:

$$\cos 15^\circ$$

$$\sin(-15^\circ)$$

Given: $\cos \theta = -\frac{3}{5}$, $\pi < \theta < \frac{3\pi}{2}$

$$\sin \frac{\theta}{2}$$

$$\cos \frac{\theta}{2}$$

$$\tan \frac{\theta}{2}$$