

Additions and Subtraction Formulas  
Trigonometry (Sheet1)

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## Addition and Subtraction formulas

The addition and subtraction formulas for trigonometric functions are below:

### Addition Formulas

$$\sin(\theta + \phi) = \sin \theta \cos \phi + \cos \theta \sin \phi$$

$$\cos(\theta + \phi) = \cos \theta \cos \phi - \sin \theta \sin \phi$$

$$\tan(\theta + \phi) = \frac{\tan \theta + \tan \phi}{1 - \tan \theta \tan \phi}$$

### Subtraction Formulas

$$\sin(\theta - \phi) = \sin \theta \cos \phi - \cos \theta \sin \phi$$

$$\cos(\theta - \phi) = \cos \theta \cos \phi + \sin \theta \sin \phi$$

$$\tan(\theta - \phi) = \frac{\tan \theta - \tan \phi}{1 + \tan \theta \tan \phi}$$

### Double angle formulas

The double angle formulas for trigonometric functions reduce a trigonometric value of a “double” angle, an angle of the form  $2\theta$  to a combination of products and additions of trigonometric functions of the single angle  $\theta$ . The double angle formulas can be found below:

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

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

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

## Exercises

Evaluate the following.

a)  $\sin(\pi/3 + \pi/4)$

f)  $\cos(2\pi/6)$

b)  $\cos(\pi/6 - \pi)$

g)  $\tan(\pi/3)$

c)  $\sin(\pi/2 - \pi/3)$

h)  $-\cos(\pi/2 - \pi/7)$

d)  $\cos(\pi/4 + \pi/6)$

i)  $\sin(\pi/2 - \pi/6)$

e)  $\sin(2\pi/3)$

j)  $\sin(4\pi/9 + \pi/2)$