Additions and Subtraction Formulas (Sheet 2)
Trigonometry

Addition and Subraction 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 2θ to a combination of products and additions of trigonometric functions of the single angle θ. 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

Evalue the following.

a) $\csc(\pi/3)$

b) $\sec(\pi/4)$

c) $\cot(\pi/6)$

d) $\cot(\pi/2 - 11\pi/12)$

e) $\tan(\pi/2 - \pi/4)$

f) $\sec(\pi/6 + \pi/2)$

g) $\csc(\pi/2 - 2\pi/3)$

h) $\cot(5\pi/4 + \pi/2)$

i) $\csc(7\pi/4 + \pi/2)$

j) $\tan(9\pi/6 + \pi/2)$

k) $\sin(0 + 3\pi)$