5.3 Sum & Difference Identities

$$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$$
$$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$

$$\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$$
$$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$$

$$\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$

$$\tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$$

Find the exact value of:

$\cos 105°$

$\sin 15°$

$\tan\left(\frac{5\pi}{12}\right)$

Write as the sin, cos, or tan of an angle:

$$\sin 50° \cos 26° - \cos 50° \sin 26°$$

$$\cos 50° \cos 26° - \sin 50° \sin 26°$$

$$\frac{\tan \frac{\pi}{3} - \tan \frac{\pi}{4}}{1 + \tan \frac{\pi}{3} \tan \frac{\pi}{4}}$$

Prove the identity:

$$\cos\left(x - \frac{\pi}{2}\right) = \sin x$$

If one of the angles in a sum or difference is a quadrantal angle (multiple of 90 or $\pi/2$) then the sum-difference identities yield single-termed expressions.

We call these reduction formulas

$$\sin(x-y)+\sin(x+y)=2\sin x\cos y$$

Use your knowledge of identities to describe the transformation of these graphs.

$\cos(x-3)$

$\cos(3-2x)$

Just like in 5.1 we can use identities to help us solve equations using trig

$$\cos 3x \cos x = \sin 3x \sin x$$

$$\sin(3x) = 3\cos^2 x \sin x - \sin^3 x$$