

## 6.2 Sum and Difference, Double Angle Identities

### Sum and Difference Identities

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

### **\*not given: Even-Odd Identities:**

$$\sin(-A) = -\sin A$$

$$\cos(-A) = \cos A$$

$$\tan(-A) = -\tan A$$

**Example 1:**

a.) Find the exact value of  $\sin 105^\circ$

b.) Find the exact value of  $\cos \frac{\pi}{12}$

c.) Simplify  $\cos(180^\circ + x)$

d.) Given  $\cos A = \frac{7}{25}$  in quadrant IV, and  $\sin B = -\frac{3}{5}$  in quadrant III, find  $\tan(A - B)$

### Double Angle Identities

-can be derived from above

$$\sin 2A = 2 \sin A \cos A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$= 2 \cos^2 A - 1$$

$$= 1 - 2 \sin^2 A$$

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

### Example 2:

Simplify:

$$\frac{\cos 2x}{\sin x - \cos x}$$

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