

Name: \_\_\_\_\_

## Sum and Difference Formulas

- 1) Use the sum and difference identities for the sine and cosine functions to deduce each of the following:

$$1) \quad \sin(x + \pi) = -\sin x$$

$$2) \quad \cos(-x) = \cos x$$

$$3) \quad \tan(\pi - x) = -\tan x$$

$$4) \quad \cot\left(\frac{\pi}{2} + x\right) = -\tan x$$

- 2) Find all solutions of the equation in the interval  $[0, 2\pi)$ .

$$1) \quad \sin\left(x + \frac{\pi}{4}\right) - \sin\left(x - \frac{\pi}{4}\right) = 1$$

$$2) \quad \cos\left(x + \frac{\pi}{6}\right) - \cos\left(x - \frac{\pi}{6}\right) = 1$$

$$3) \quad \sin\left(x + \frac{\pi}{2}\right) - \sin\left(x - \frac{\pi}{2}\right) = \sqrt{3}$$

$$4) \quad \cos\left(x + \frac{3\pi}{4}\right) - \cos\left(x - \frac{3\pi}{4}\right) = 0$$

- 3) Find all the solutions of the equation  $\cos 3x \cos x + \sin 3x \sin x = \frac{\sqrt{3}}{2}$  on the interval  $[0, 2\pi)$

- 4) Give the exact value of each expression without using a calculator

$$1) \quad \sin\left(\sin^{-1}\frac{1}{2} + \tan^{-1}(-3)\right)$$

$$2) \quad \cos\left(\tan^{-1}\frac{5}{12} + \tan^{-1}\frac{3}{4}\right)$$

$$3) \quad \cos\left(\sin^{-1}\frac{3}{5} + \cos^{-1}\frac{5}{13}\right)$$

$$4) \quad \tan\left(\cos^{-1}\frac{\sqrt{3}}{2} - \sin^{-1}\left(-\frac{3}{5}\right)\right)$$

$$5) \quad \cos\left(\arctan\sqrt{3} + \arcsin\frac{1}{3}\right)$$