Name: _____

Sum – to – Product Formulas

1) Use the sum – to – product formulas to write the sum or difference as a product

   1) $\sin\frac{5\pi}{4} - \sin\frac{3\pi}{4}$ 2) $\sin\left(x + \frac{\pi}{2}\right) + \sin\left(x - \frac{\pi}{2}\right)$

   3) $\sin x + \sin 5x$ 4) $\cos(x + 2\pi) - \cos x$

   5) $\sin 3\theta + \sin\theta$ 6) $\cos 120^0 + \cos 30^0$

   7) $\cos\frac{3\pi}{4} - \cos\frac{\pi}{4}$ 8) $\cos 6x + \cos 2x$

   9) $\sin 5\theta - \sin 3\theta$ 10) $\sin(\alpha + \beta) - \sin(\alpha - \beta)$

   11) $\cos\left(\theta + \frac{\pi}{2}\right) - \cos\left(\theta - \frac{\pi}{2}\right)$

2) Write $\sin 2\theta - \sin 4\theta$ as a product of two functions

3) Find the value of $\cos\frac{\pi}{12} + \cos\frac{5\pi}{4}$ by using a Sum-to-Product Formula.

4) Verify the identity $\dfrac{\sin 3x + \sin 7x}{\cos 3x - \cos 7x} = \cot 2x$

5) Prove the trigonometric identities:

   1) $\tan\left(\frac{x + y}{2}\right)\tan\left(\frac{x - y}{2}\right) = \dfrac{\cos y - \cos x}{\cos x + \cos y}$

   2) $\dfrac{\sin 7x + \sin 3x}{\cos 7x + \cos 3x} = \tan 5x$

6) Solve the equation $\cos 5x + \cos x = 2\cos 2x$

7) Solve the equation $\sin x = \sin 5x$