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**Trigonometric Equations**

(Haf 2006)

5. By putting  $t = \tan\left(\frac{\theta}{2}\right)$ , find the general solution of the equation

$$3\cos\theta + 4\sin\theta = 3 - \tan\left(\frac{\theta}{2}\right). \quad [9]$$

(Haf 2007)

4. Find the general solution of the equation

$$\sin 2\theta + \sin 4\theta = \cos\theta. \quad [9]$$

(Haf 2008)

4. Consider the equation

$$2\sin\theta + 3\cos\theta = 1.$$

- (a) Putting  $t = \tan\left(\frac{\theta}{2}\right)$ , show that

$$2t^2 - 2t - 1 = 0. \quad [3]$$

- (b) Hence find the general solution, in radians, of the above trigonometric equation. [5]

(Haf 2009)

4. Find the general solution to the equation

$$\sin\theta + \sin 2\theta + \sin 3\theta = 0. \quad [7]$$

(Haf 2010)

3. Consider the equation

$$5\sin x - 5\cos x = 1.$$

- Putting  $t = \tan\left(\frac{x}{2}\right)$ , show that

$$2t^2 + 5t - 3 = 0.$$

- Hence find the general solution to the above trigonometric equation. [10]

(Haf 2011)

2. Find the general solution to the equation

$$\cos\theta + \cos 3\theta + \cos 5\theta = 0. \quad [7]$$

(Haf 2012)

3. By putting  $t = \tan\left(\frac{x}{2}\right)$ , find the general solution to the equation

$$3 \sin x = \tan\left(\frac{x}{2}\right). \quad [8]$$

(Haf 2013)

2. Consider the equation

$$\sin \theta + 3 \cos \theta = 2.$$

- (a) Putting  $t = \tan\left(\frac{\theta}{2}\right)$ , show that

$$5t^2 - 2t - 1 = 0. \quad [3]$$

- (b) Hence find the general solution of the above trigonometric equation, giving your answers in radians. [6]

(Haf 2014)

5. Find the general solution to the equation

$$\sin \theta + \sin 5\theta = \cos 2\theta. \quad [8]$$

(Haf 2015)

4. Find the general solution to the equation

$$\cos\left(\theta + \frac{\pi}{6}\right) + \cos\left(2\theta + \frac{\pi}{6}\right) + \cos\left(3\theta + \frac{\pi}{6}\right) = 0. \quad [8]$$

(Haf 2016)

4. Using the substitution  $t = \tan\left(\frac{x}{2}\right)$ , find the general solution, in radians, to the equation

$$\sin x + \tan x + \tan\left(\frac{x}{2}\right) = 0. \quad [11]$$

(Haf 2017)

5. Find the general solution to the equation

$$\cos \theta - \cos 5\theta = \sin 3\theta. \quad [8]$$

(Haf 2018)

4. (a) By putting  $t = \tan \frac{x}{2}$ , show that the equation

$$\sec x + \tan x = 2$$

can be written in the form

$$3t^2 + 2t - 1 = 0. \quad [3]$$

(b) Hence find the general solution of the equation

$$\sec x + \tan x = 2. \quad [7]$$