June 2015

Question 7   4 marks

Solve the following equation algebraically over the interval $[0, 2\pi]$.

$$\underline{\cos 2\theta} - 3\sin\theta - 2 = 0$$
^{2}

$$1 - 2\sin^2\theta - 3\sin\theta - 2 = 0$$

$$2\sin^2\theta + 3\sin\theta + 1 = 0$$

$$(2\sin\theta + 1)(\sin\theta + 1) = 0$$

$$\sin\theta = -\frac{1}{2} \qquad\qquad \sin\theta = -1$$

$$\theta = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2}$$

January 2015

Question 7   4 marks

Solve the following equation algebraically for x, where $0 \le x \le 2\pi$.

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

$$2(1 - \sin^2 x) = -3\sin x$$

$$2 - 2\sin^2 x = -3\sin x$$

$$0 = 2\sin^2 x - 3\sin x - 2$$

$$0 = (2\sin x + 1)(\sin x - 2)$$

$$\sin x = -\frac{1}{2} \qquad\qquad\qquad \sin x = 2$$

$$\qquad\qquad\qquad\qquad\qquad\qquad \text{no solution}$$

$$x = \frac{7\pi}{6}, \frac{11\pi}{6}$$

June 2014

Question 36   1 mark

Explain the error that was made when solving the following equation:

$$\sin 2\theta = \cos\theta, \text{ where } \theta \in \mathbb{R}$$

$$\sin 2\theta = \cos\theta$$

$$2\sin\theta\cos\theta = \cos\theta$$

$$\frac{2\sin\theta\cos\theta}{\cos\theta} = \frac{\cos\theta}{\cos\theta}$$

$$2\sin\theta = 1$$

$$\sin\theta = \frac{1}{2}$$

$$\theta = \frac{\pi}{6} + 2k\pi, \frac{5\pi}{6} + 2k\pi, k \in I$$

DO NOT Divide out $\cos\theta$. You are then missing all the answers where $\cos\theta = 0$.

Instead, you should <u>factor</u>!

1

Question 7   4 marks

Solve the following equation over the interval $[0, 2\pi]$.

$2\cos 2\theta - 1 = 0$

$2(1 - 2\sin^2\theta) - 1 = 0$

$2 - 4\sin^2\theta - 1 = 0$

$-4\sin^2\theta + 1 = 0$

$\sin^2\theta = +\frac{1}{4}$

$\sin\theta = \pm\frac{1}{2}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

Question 7   4 marks

Solve the following equation algebraically where $180° \leq \theta \leq 360°$.

$2\sin^2\theta + 5\cos\theta + 1 = 0$

$2(1 - \cos^2\theta) + 5\cos\theta + 1 = 0$

$2 - 2\cos^2\theta + 5\cos\theta + 1 = 0$

$2\cos^2\theta - 5\cos\theta - 3 = 0$

$(2\cos\theta + 1)(\cos\theta - 3) = 0$

$\cos\theta = -\frac{1}{2}$ $\cos\theta = 3$

                                       no solution

$\theta = \frac{2\pi}{3}, \frac{4\pi}{3}$

$\cancel{2000}, 240°$