Unit 5: Trigonometry

Subunit 5.4: Trigonometric identities

Topical Question No: 1

4 **(a)** Prove that $\dfrac{(\sin\theta+\cos\theta)^2-1}{\cos^2\theta} \equiv 2\tan\theta$. [3]

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(b) Hence solve the equation $\dfrac{(\sin\theta+\cos\theta)^2-1}{\cos^2\theta} = 5\tan^3\theta$ for $-90^\circ < \theta < 90^\circ$. [3]

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Topical Question No: 2

7 **(a)** Prove the identity $\dfrac{1+\sin\theta}{\cos\theta} + \dfrac{\cos\theta}{1+\sin\theta} \equiv \dfrac{2}{\cos\theta}$. [3]

(b) Hence solve the equation $\dfrac{1+\sin\theta}{\cos\theta} + \dfrac{\cos\theta}{1+\sin\theta} = \dfrac{3}{\sin\theta}$, for $0 \leqslant \theta \leqslant 2\pi$. [3]

Topical Question No: 3

7 **(a)** Prove the identity $\dfrac{1 - 2\sin^2\theta}{1 - \sin^2\theta} \equiv 1 - \tan^2\theta$. [2]

(b) Hence solve the equation $\dfrac{1 - 2\sin^2\theta}{1 - \sin^2\theta} = 2\tan^4\theta$ for $0° \leqslant \theta \leqslant 180°$. [3]

Topical Question No: 4

10 **(a)** Prove the identity $\dfrac{1+\sin x}{1-\sin x} - \dfrac{1-\sin x}{1+\sin x} \equiv \dfrac{4\tan x}{\cos x}$. [4]

(b) Hence solve the equation $\dfrac{1+\sin x}{1-\sin x} - \dfrac{1-\sin x}{1+\sin x} = 8\tan x$ for $0 \leqslant x \leqslant \frac{1}{2}\pi$. [3]

Topical Question No: 5

4 **(a)** Prove the identity $\dfrac{\sin^3\theta}{\sin\theta - 1} - \dfrac{\sin^2\theta}{1 + \sin\theta} \equiv -\tan^2\theta(1 + \sin^2\theta)$. [4]

Topical Question No: 6

5 **(a)** Prove the identity $\dfrac{\sin^2 x - \cos x - 1}{1 + \cos x} \equiv -\cos x$. [3]

(b) Hence solve the equation $\dfrac{\sin^2 x - \cos x - 1}{2 + 2\cos x} = \dfrac{1}{4}$ for $0° \leqslant x \leqslant 360°$. [3]